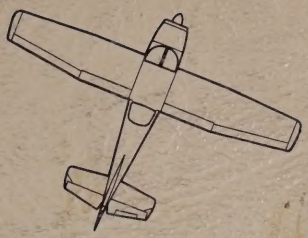
Cessna-Crafted
ELECTRONICS



SERIES

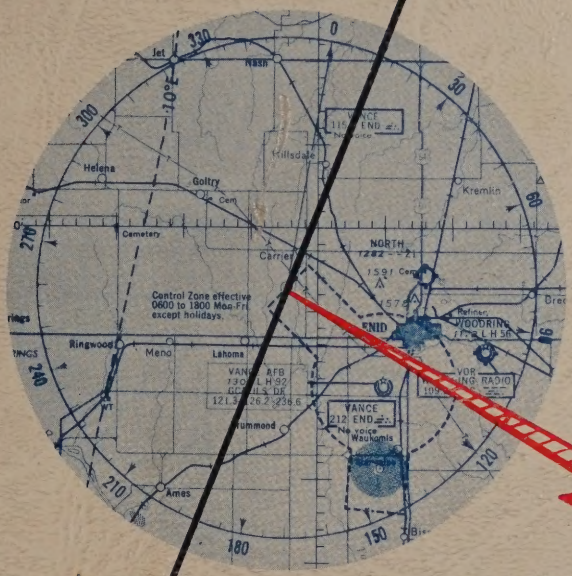
500

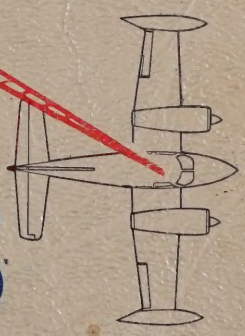
TRANSCEIVER

NAV/COM

NAV/OMNI

ADF





SERVICE / PARTS MANUAL

Cessna-Crafted
ELECTRONICS

SERIES 500 ELECTRONICS SERVICE / PARTS MANUAL

This manual contains recommended service information and illustrated parts breakdown applicable to Cessna Series 500 Electronics. This information is supplemented and kept current by Service Letters and Service News Letters published by the Cessna Aircraft Company. Recommended replacement parts for your Series 500 Electronics are available from the Cessna Parts Department.

Each radio system is described in a separate section of this manual. Each section has a table of contents to aid in locating the desired information. Sections contained in this manual are as follows:

SECTION 1 TRANSCEIVER
SECTION 2 NAV/COM
SECTION 3 NAV/OMNI
SECTION 4 ADF

D-206-13—GRIT—1500—8/13/63

15 JULY 1963

SECTION 1

CESSNA TRANSCEIVER 500

LIST OF REVISED PAGES ISSUED

INSERT LATEST REVISED PAGES. DESTROY SUPERSEDED PAGES.

CESSNA TRANSCEIVER 500

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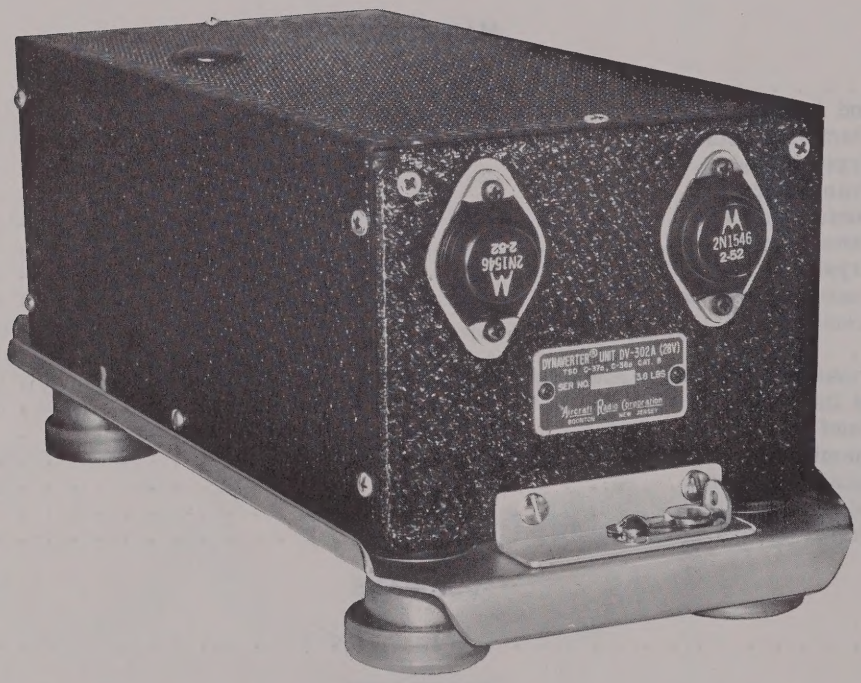
28410-1000 RECEIVER
WITH
27591 MOUNTING



28420-0014 DYNAVERTER
28420-0028 DYNAVERTER
WITH
24900 MOUNTING

Figure 1-1. Cessna Transceiver 500

CESSNA TRANSCEIVER 500

General Information

INTRODUCTION.

This Section contains information, operation maintenance, and parts information for the Cessna Transceiver 500 Equipment.

PURPOSE.

The Cessna Transceiver 500 is an airborne communications equipment capable of receiving and transmitting on any one of 360 automatically tuned, crystal-controlled channels. The channels are spaced 50 kc apart and cover a frequency range of 118.00 to 135.95 mc.

SPECIFICATIONS.

Receiver-Transmitter.

General.

Frequency Range:	118.00 to 135.95 mc
Number of Channels:	360
Channel Spacing:	50 kc
Mounting:	26780, 26790, 27591, or 27594
Weight:	4.1 pounds; 5.35 pounds with 26780, 5.80 pounds with 26790; 4.85 pounds with 27591; 5.35 pounds with 27594
Certification:	FAA TSO C37a and C38, Category B

Receiver.

Input Impedance:	52 ohms nominal
Sensitivity:	S+N/N greater than 6 db with 3 μv input
Audio Output:	6 watts when used with Dynaverter
Agc:	Audio output flat within 3.5 db with an input of 10 μv to 20,000 μv
i-f Rejection:	At least 90 db
Image Rejection:	At least 65 db
Selectivity:	30 kc, 6 db down; 75 kc, 60 db down
Total Harmonic Distortion:	Less than 15% with 20,000 μv, 1000 cps, 85% distortion
Audio Frequency Response:	Within 6 db from 350 cps to 3000 cps
Squelch:	Adjustable from 0 to 10 μv

Tube Complement:		
	5654	r-f amplifier
	5654	First mixer
	5670	Receiver megacycle oscillator and fractional megacycle oscillator
	5749	i-f amplifier (2.0 mc)
	5749	i-f amplifier (455kc)
	5750	Third mixer
	5751	Squelch control and first audio amplifier
	5814A(1/2)	Audio output amplifier
	6136	i-f amplifier (455kc)
	6922(1/2)	Second mixer

Diode Complement:		
	HD6226	Audio detector
	HD6226	Agc clamp
	HD6226	Automatic noise limiter

Transmitter.

Power Output:	8 watts nominal
Modulation:	High level with automatic limiting at 95% modulation
Modulation Capability:	Less than 0.25 volt rms input in series with 100 ohms required for 100% modulation
Modulation Fidelity:	Modulation level flat within 6 db from 350 to 2500 cps
Spurious Output:	At least 60 db below carrier level
Frequency Stability:	Within 0.01% of designated frequency

Tube Complement:	5686	Driver amplifier
	6688	Buffer amplifier
	6922	Balanced mixer
	6822(1/2)	Transmitter mega-cycle oscillator
	7551	Power amplifier

Dynaverter.

Power Input:	6.5 amperes (receive), 8.5 amperes (transmit) at 13.75 volts dc; 3.25 amperes (receive), 4.25 amperes (transmit) at 27.5 volts dc
Power Output:	35 milliamperes (receive), 75 milliampers (modulate) at 320 volts dc; 6 millamperes (receive-transmit), 20 milliamperes (receive), 10 milliamperes (transmit) at 160 volts dc; 20 milliampers (screen) at 250 volts dc

Transistor Complement:

14-volt Model	Function
2N270	Microphone amplifier
2N176(2)	Driver amplifier
2N176(2)	Output amplifier
2N1546(2)	Multivibrator

28-volt Model	Function
2N270	Microphone amplifier
2N375(2)	Driver amplifier
2N375(2)	Output amplifier
2N1545(2)	Multivibrator

Diode Complement:	1N2070	Bias rectifier
	1N2070(4)	Bridge rectifier
	1N1560	Blocking diode

Weight:	3.8 pounds; 4.3 pounds with 24900
Dimensions:	4 3/4 inches wide, 4 9/16 inches high, 10 3/8 inches long with 24900
Certification:	FAA TSO C37a and C38, Category B

DESCRIPTION OF UNITS.

Receiver-Transmitter.

The Receiver-Transmitter is an airborne, panel-mounted, 360 channel communications unit consisting of a tripple-conversion superheterodyne receiver and a voice amplitude-modulator transmitter.

A total of 57 crystals are used in the Receiver-Transmitter for frequency synthesis of the receiver and transmitter circuits. The Receiver-Transmitter also uses 14 electron tubes and three crystal diodes. A four-gang, variable capacitor and five variable printed-circuit inductors are mechanically linked to the megacycle channel selector switch. When rotated the switch automatically tunes the receiver and transmitter r-f circuits. An antenna relay permits the use of a single antenna for receiving and transmitting.

The Receiver-Transmitter operating controls are located on the front panel. These controls include a combination volume and primary power on-off control, a squelch control, and frequency channel selector switches. An illuminated channel frequency indicator is associated with the switches.

Electrical connections to the Receiver-Transmitter are through two cable assemblies at the rear of the unit.

Dynaverter.

The Dynaverter is a transistorized audio amplifier and power converter. Audio signals from a microphone are amplified and used to amplitude-modulate the transmitter r-f signal. During receive condition, a headset output may be obtained from the Dynaverter or the modulator may be connected to serve as a cabin amplifier to supply speaker output. The Dynaverter converts the primary low-voltage dc of the aircraft to high-voltage dc for use in the Receiver-Transmitter.

The seven transistors used in the Dynaverter are secured directly to the chassis or by a clamp to promote heat dissipation. Control relays for the Receiver-Transmitter, such as a power on-off relay and microphone relay, are located in the Dynaverter. The Dynaverter is available as a 14-volt or 28-volt model.

All input ond output electrical connections to the Dynaverter are made through two cable assemblies at the rear of the chassis.

Mountings.

The 26780 Mounting and the 26790 Mounting are used to shock-mount one or two Receiver-Transmitters, respectively. When shock mounting is not required, a 27591 or 27594 Mounting is used for mounting one or two Receiver-Transmitters, respectively. Each mounting fits into a panel cutout and is secured to the panel flanges with No. 6 screws. The Receiver-Transmitter is secured to the mounting by captive knurled nuts at the rear of the mounting. Each mounting serves as a dust cover. The 24900 Mounting is used to shock-mount the Dynaverter.

BASIC PRINCIPLES OF OPERATION.

Receiver Circuits.

As shown in Figure 1-2, an r-f signal picked up by the antenna is fed through an r-f amplifier, V101, to the first mixer, V102. The first mixer also receives the output (98.176-115.176 mc) of the crystal-controlled receiver oscillator, V108A. The two mixer input signals mix to produce a first i-f signal, variable from 19.824 to 20.774 mc. Coupled to the second mixer, V103A, the first i-f signal is mixed with the output (21.824-22.774 mc) of the crystal-controlled fractional megacycle oscillator, V108B, to produce a second i-f signal of 2.0 mc. The second i-f signal is coupled

to an i-f amplifier, V104. The third mixer V105, produces a third i-f signal by mixing the second i-f signal with a crystal-controlled 1545 kc signal. i-f amplifiers V106 and V107 amplify the third i-f signal. This signal is coupled to the detector and agc diodes. CR104 and CR105, where the receiver audio signal is detected and an agc bias and a squelch bias are produced.

The receiver audio signal is fed through an automatic noise limiter, CR102, to the first audio amplifier, V110A. Simultaneously, the squelch control, V110B, develops a control bias for the V110A. Further amplification of the receiver audio signal is obtained with the second audio amplifier, V109, whose plate load, T301, is in the Dynaverter. The receiver audio signal is fed either to a headset or through one of the auxiliary audio input terminals to the Dynaverter driver amplifier, Q304 and Q305, and the Dynaverter output amplifier, Q306 and Q307, to an aircraft speaker.

Transmitter Circuits.

As shown in Figure 1-2, the unmodulated transmitter r-f signal (118.00-135.95 mc) is obtained by combining the output (96.176-113.176 mc) of the crystal-controlled transmitter megacycle oscillator, V103B, with the output (21.824-22.774 mc) of the crystal-controlled fractional megacycle oscillator, V108B. The balanced mixer, V204, mixes two oscillator signals to produce a low-voltage r-f signal. The r-f signal is amplified by three r-f amplifiers: buffer amplifier V203, driver amplifier V202, and power amplifier V201.

An audio signal, from a microphone, is fed through three transistorized amplifiers in the Dynaverter: microphone amplifier Q301, driver amplifier Q304 and Q305, and output amplifier Q306 and Q307. The amplified audio signal is used to plate-modulate the power amplifier, V201. The amplitude-modulator r-f signal is coupled to the antenna.

Operations.

For operation of the Cessna Transceiver 500, refer to: CESSNA TRANSCEIVER 500, NAV/COM 500, and NAV/OMNI 500, PILOTS MANUAL.

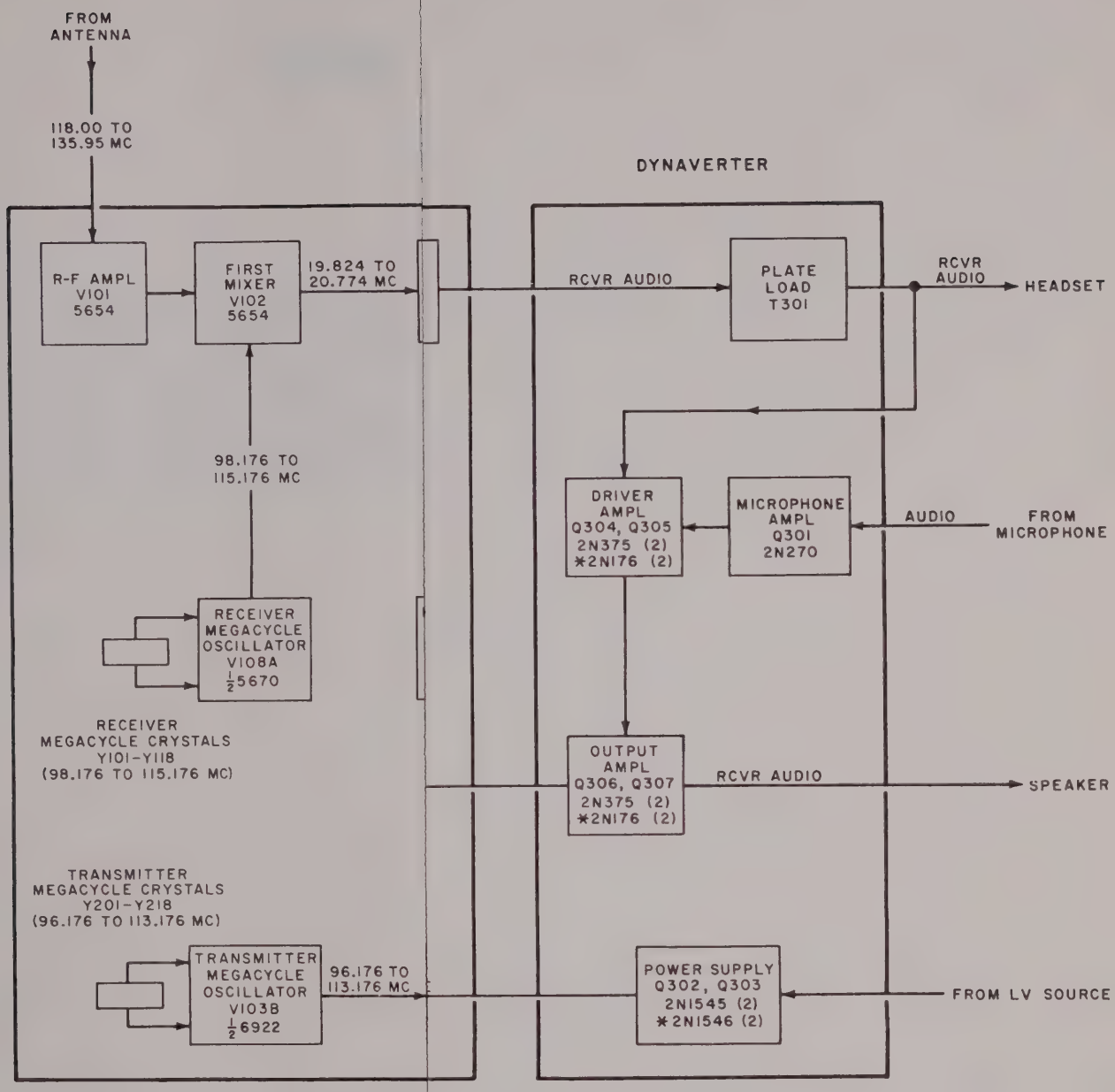
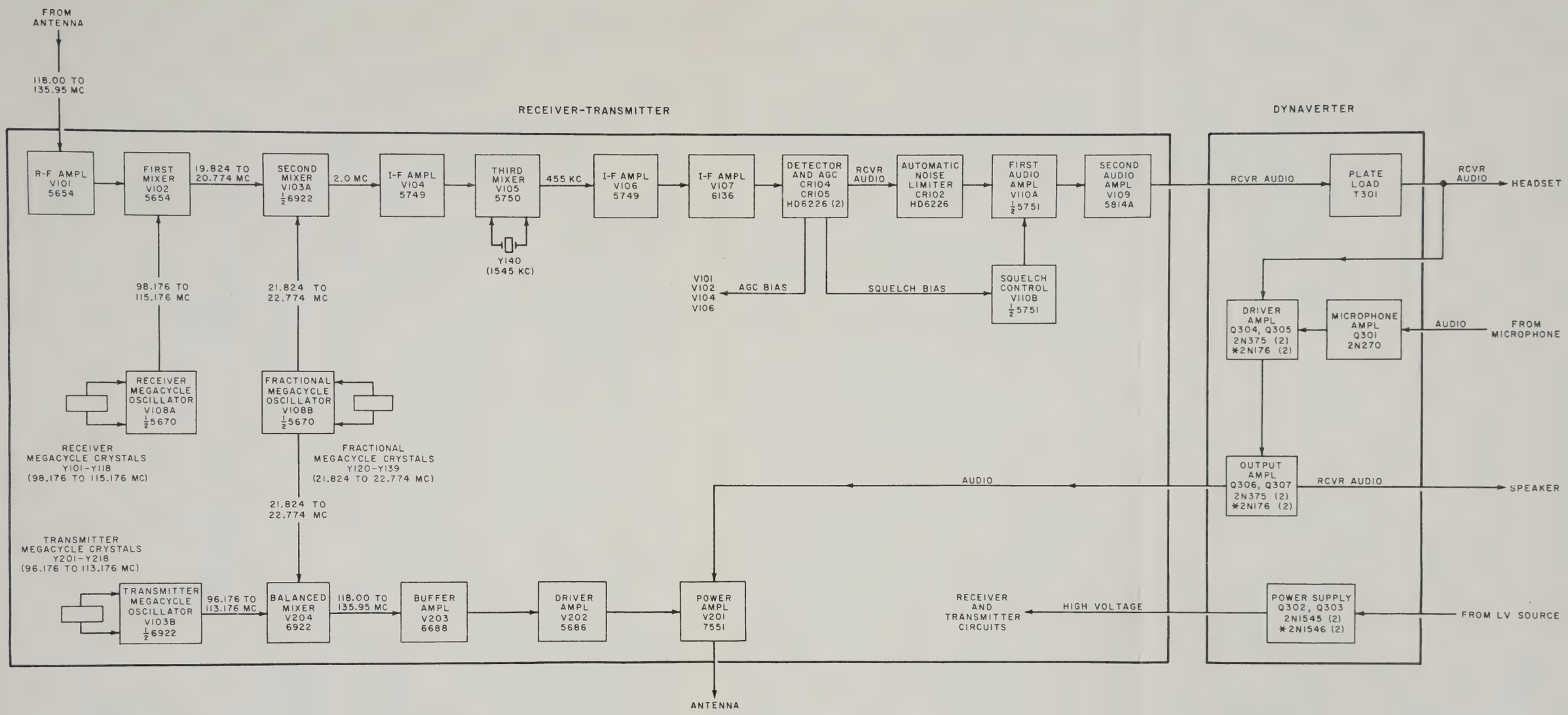

FROM ANTENNA
118.00 TO 135.95 MC
DYNAVERTER
R-F AMPL V101 5654
FIRST MIXER V102 5654
19.824 TO 20.774 MC
RCVR AUDIO
PLATE LOAD T301
RCVR AUDIO
HEADSET
98.176 TO 115.176 MC
DRIVER AMPL Q304, Q305 2N375 (2) *2N176 (2)
MICROPHONE AMPL Q301 2N270
AUDIO
FROM MICROPHONE
RECEIVER MEGACYCLE OSCILLATOR V108A 1/2 5670
RECEIVER MEGACYCLE CRYSTALS Y101-Y118 (98.176 TO 115.176 MC)
OUTPUT AMPL Q306, Q307 2N375 (2) *2N176 (2)
RCVR AUDIO
SPEAKER
TRANSMITTER MEGACYCLE CRYSTALS Y201-Y218 (96.176 TO 113.176 MC)
TRANSMITTER MEGACYCLE OSCILLATOR V103B 1/2 6922
96.176 TO 113.176 MC
POWER SUPPLY Q302, Q303 2N1545 (2) *2N1546 (2)
FROM LV SOURCE

Figure 1-2. Cessna Transceiver 500, Block Diagram



NOTE: TRANSISTOR TYPES PRECEDED BY AN ASTERISK (*) ARE USED IN 14-VOLT MODELS.

Figure 1-2. Cessna Transceiver 500, Block Diagram

CESSNA TRANSCEIVER 500

Adjustment

POST-INSTALLATION TESTS.

Though the tuning of the Receiver-Transmitter is fully automatic and no tuning adjustments are required prior to placing the Receiver-Transmitter in operation, ground-check reception and transmission on several local frequencies with the aircraft engines running and with all electrical equipment operating. For operating procedure of the Receiver-Transmitter refer to: CESSNA TRANSCEIVER 500, NAV/COM 500 and NAV/OMNI 500 PILOTS MANUAL.

During the ground-check of the Cessna Transceiver 500, adjust the Dynaverter sidetone potentiometer, R317 (see Figure 1-19), for an acceptable audio output level. If the audio interconnection of the Cessna Transceiver 500 and Cessna Nav/Com 500 is used, adjust R344 in the Dynaverter to equalize the audio output of the Cessna Transceiver 500 and Cessna Nav/Com 500.

CESSNA TRANSCEIVER 500

Maintenance

INTRODUCTION.

The following contains maintenance data for the Cessna Transceiver 500 Communications Equipment. Included are a list of test equipment and accessories required for maintenance, procedures for replacement of parts, disassembly procedures, lubrication information, equipment performance and trouble analysis information, alignment procedures, and typical voltage, resistance, voltage level, and stage gain measurements. To help locate and identify individual parts, interior views of the units are also included in this section. Complete schematic and wiring diagrams of the units are included in Section IV.

WARNING

Voltages in this equipment are dangerous and may be fatal if contacted. Observe all safety precautions.

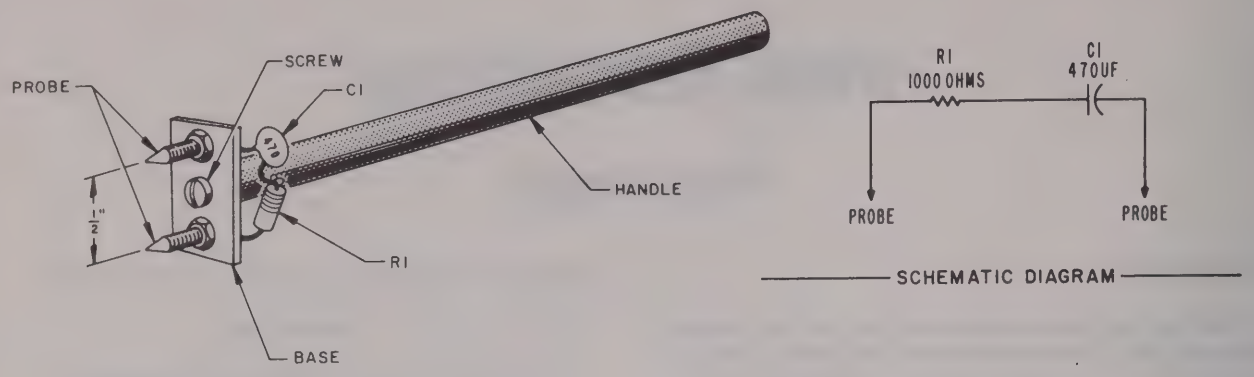
TEST EQUIPMENT AND ACCESSORIES.

Table 1-1 lists the test equipment and accessories required for maintenance of the Cessna Transceiver 500.

TABLE 1-1. TEST EQUIPMENT AND ACCESSORIES

Qty	Name	Designation or Characteristics
	TEST EQUIPMENT	
1	Audio Oscillator	Hewlett-Packard Model 200AB
1	Multimeter	Simpson Model 260
1	Oscilloscope	Tektronix Model 310
1	R-f Wattmeter	Bird Electronic Model 61
1	Signal Generator	Boonton Radio Type 211-A
1	Signal Generator	Measurements Model 65-B
1	Vacuum Tube Voltmeter	Ballantine Model 300
1	Vacuum Tube Voltmeter	Hewlett-Packard Model 410B
	ACCESSORIES	
1	Adapter	UG-201/U
1	Adapter	UG-273/U
1	Adapter	UG-349/U
1	Alignment Tool	Insulated broach type
1	Alignment Tool	Insulated slot type
1	Attenuator	Boonton Radio Type 505-B
—*	Cable	RG-58/U
1	Capacitor	22 $\mu\mu$f
5	Connector	UG-88C/U
1	Connector	AMPHENOL 126-217
2	Connector	28808
1	I-f Tuning Tool	See Figure 1-3
1	Linear Detector	See Figure 1-4
1	Microphone	———
2	Test Probe	———
1	Tuning Wand	Teflon tuning wand equipped with brass and iron tips

* Length of cable required to determine by individual bench test setup.



NOTE: BASE AND HANDLE ARE CONSTRUCTED OF NONCONDUCTIVE MATERIAL.

Figure 1-3. i-f Tuning Tool for Bench Test Setup

REPLACEMENT OF ELECTRON TUBES.

The fourteen plug-in electron tubes used in the Receiver-Transmitter are accessible after the unit is removed from its mounting and the top shield screen is removed from the unit. Tube locations are shown in Figure 1-5. If the tubes are removed for testing, replace all tubes testing "good" in the location from which they were removed. Check for normal performance any new tube that is to be installed.

REPLACEMENT OF CRYSTAL DIODES.

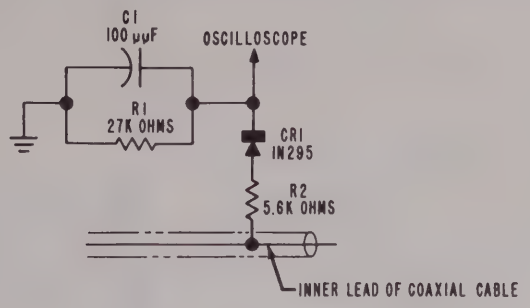
Receiver-Transmitter and Dynaverter crystal diode locations are shown in Figures 1-5 and 1-6. Table 1-2 lists the reference designation, type, function, and wiring diagram reference for each diode. If replacement of a crystal diode is required, the new crystal diode must be correctly polarized and its leads routed as nearly as possible like the original installation. When soldering a replacement diode, hold the lead with a pair of pliers between the solder joint and the diode. The pliers form a heat sink which prevents excessive heat from damaging the diode. Do not remove the pliers until the heat from the solder joint has been dissipated.

REPLACEMENT OF TRANSISTORS.

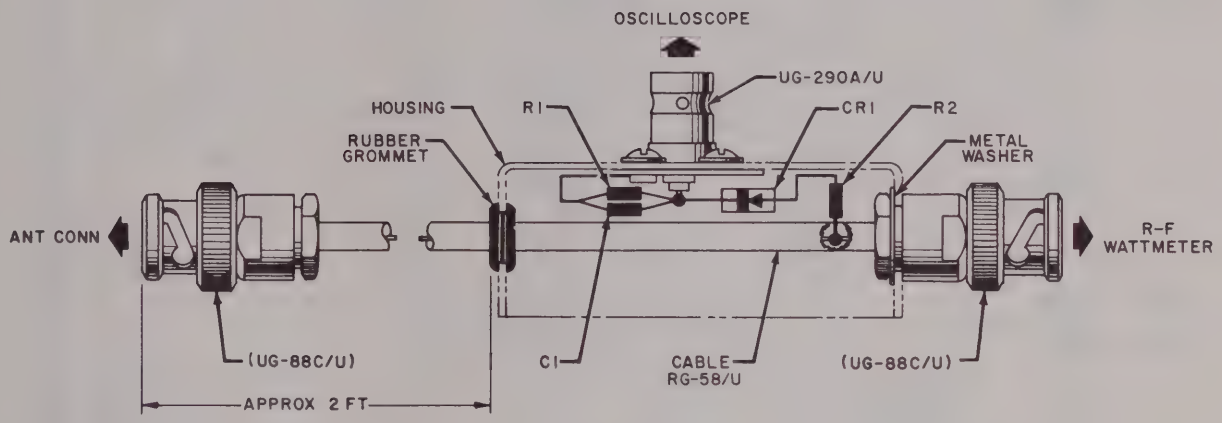
The Dynaverter uses seven transistors which are secured to the chassis by direct-mounting or by a clamp to promote heat dissipation. Locations of the transistors are shown in Figure 1-6. Figures 1-16 and 1-17 illustrate the transistor wiring. To replace a transistor, unsolder the connecting wires and remove the transistor from its mounting. If the

TABLE 1-2. LOCATION OF CRYSTAL DIODES

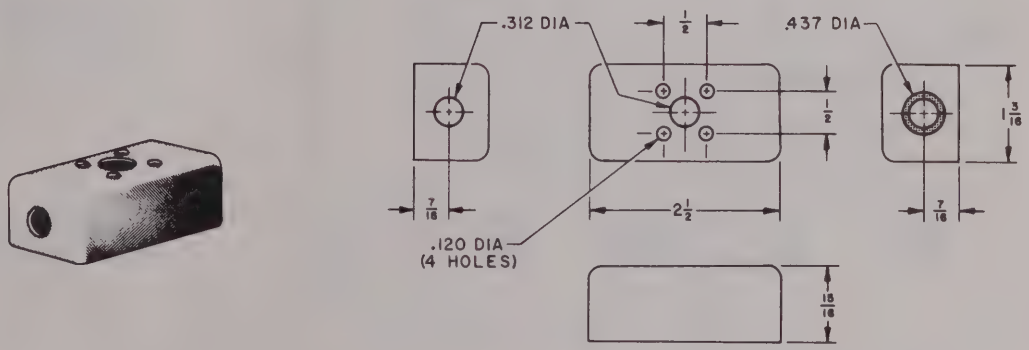
Ref Desig	Type	Function	Wiring Diagram
		Receiver-Transceiver	
CR102	HD6226	Automatic Noise Limiter	Figure 1-15
CR104	HD6226	Audio Detector	Figure 1-15
CR105	HD6226	Agc Clamp	Figure 1-15
		Dynaverter	
CR301	IN2070	Bridge Rectifier	Figure 1-23
CR302	IN2070	Bridge Rectifier	Figure 1-23
CR303	IN2070	Bridge Rectifier	Figure 1-23
CR304	IN2070	Bridge Rectifier	Figure 1-23
CR305	IN2070	Bias Rectifier	Figure 1-23
CR306	IN1560	Blocking Diode	Figure 1-21



SCHEMATIC DIAGRAM



WIRING DIAGRAM



TYPICAL HOUSING
(.031 ALUMINUM)

NOTE: DIMENSIONS ARE IN INCHES.

Figure 1-4. Linear Detector for Bench Test Setup

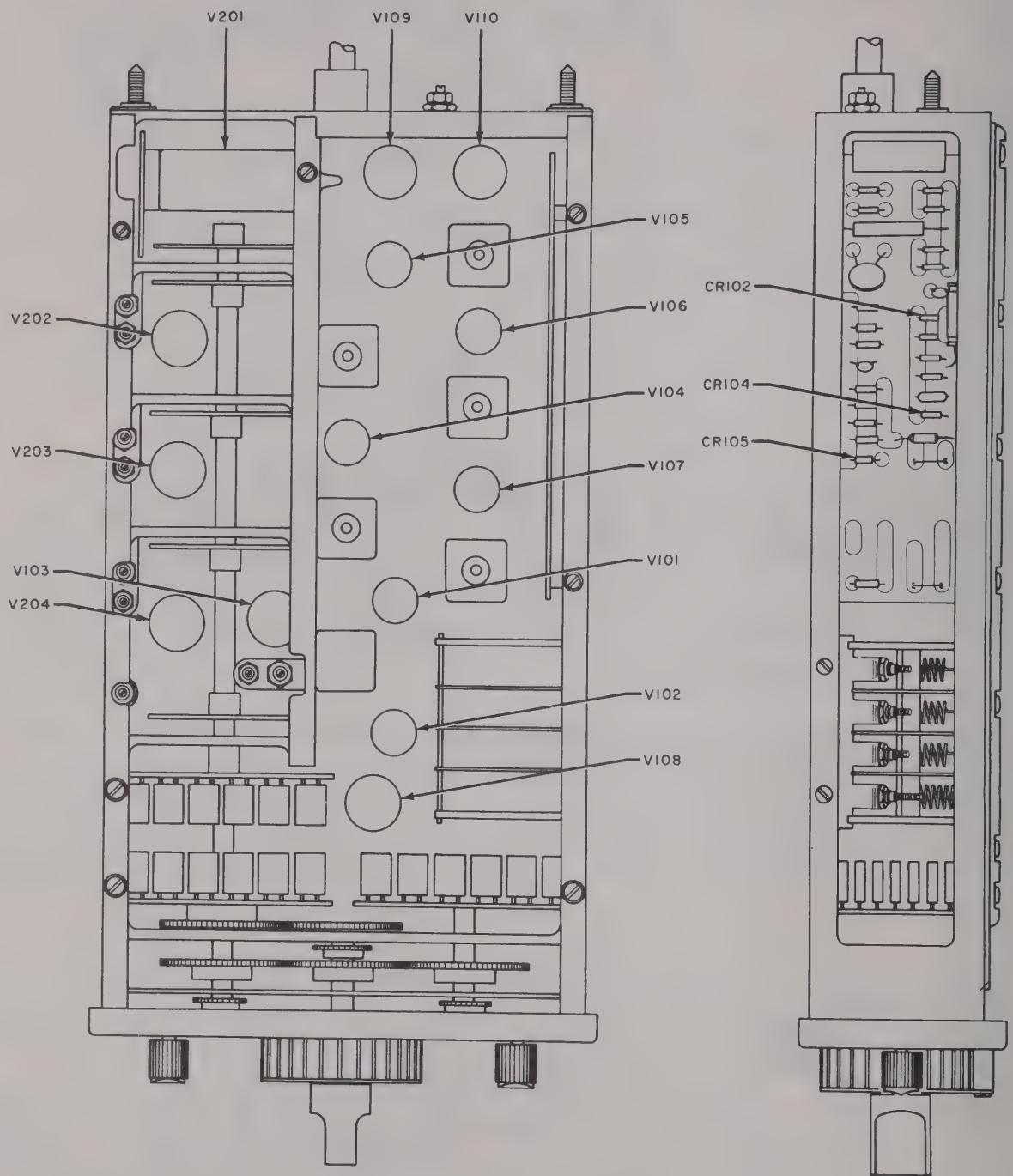


Figure 1-5. Receiver-Transmitter, Tube and Crystal Diode Locations

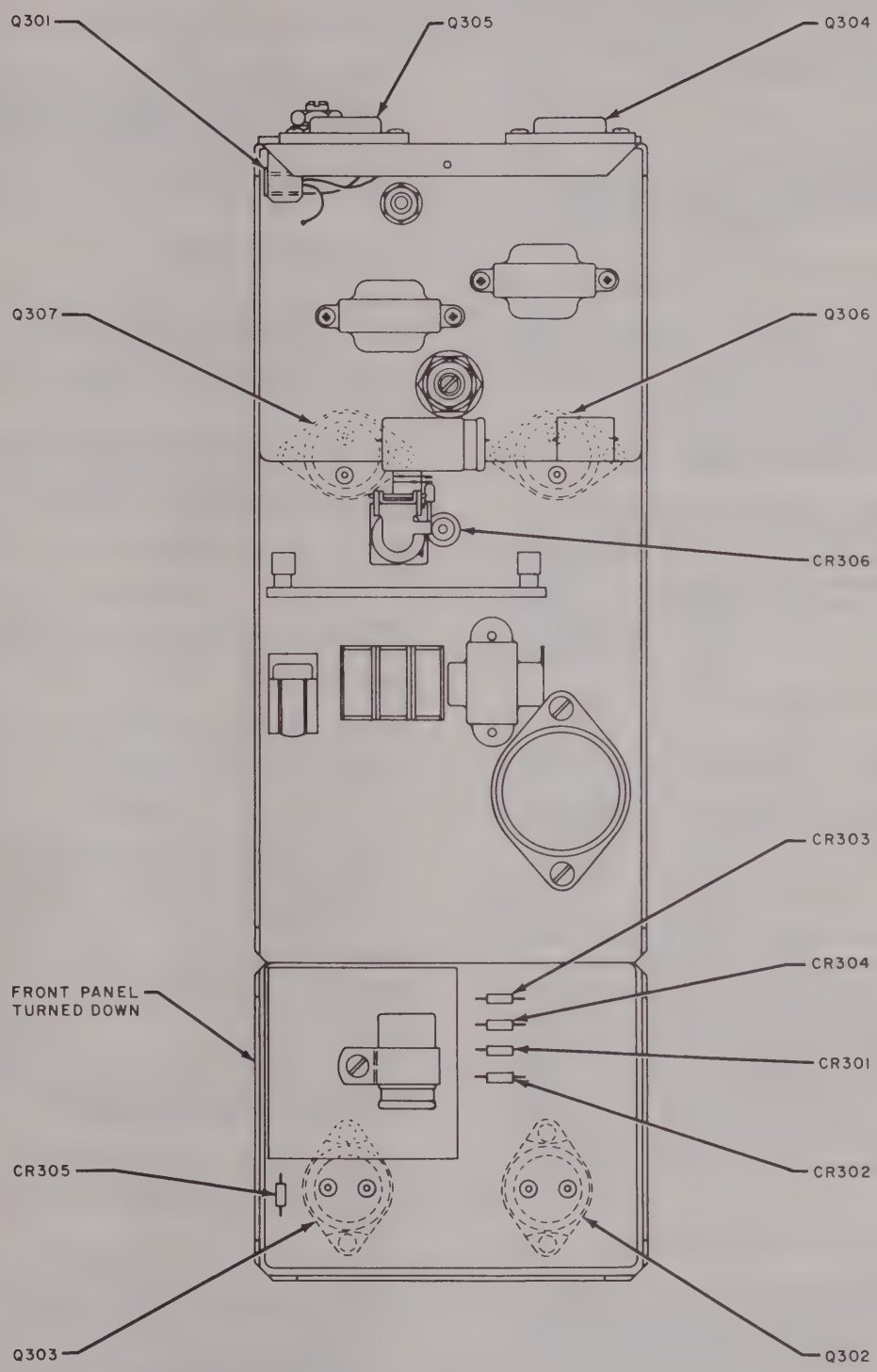


Figure 1-6. Dynaverter, Transistor and Crystal Diode Locations

transistor is mounted directly to the chassis, remove the two screws which secure it in position. Mount the replacement transistor and solder each electrical-circuit wire to the appropriate transistor lead. Hold the transistor lead with a pair of pliers between the solder joint and the transistor to form a heat sink. Do not remove the pliers until the heat from the solder joint has dissipated.

CAUTION

When mounting Q304, position the collector terminal lug so that contact with the cover-mounting screw is avoided.

REPLACEMENT OF TUNING INDUCTORS.

The tuning inductors, L203, L207, L211, L214, and L216, are printed-circuit boards. They can be replaced by disassembling the Receiver-Transmitter as outlined in "Disassembly Procedures."

REPLACEMENT OF PANEL LAMP.

The Receiver-Transmitter uses a Type GE330/R midget, flange-base panel lamp. To replace the panel lamp, disassemble the Receiver-Transmitter as outlined in "Disassembly Procedures." Replace the defective lamp, seating the flange of the replacement lamp firmly in the lamp holder. Reinstall the lamp collar and screw in finger-tight. Reassemble.

REPLACEMENT OF CRYSTALS.

Each group of crystals used in the Receiver-Transmitter is soldered to a printed-circuit board. Several of the crystals are accessible only after the removal of the printed-circuit board from the Receiver-Transmitter chassis. The printed-circuit boards are removed by disassembling the Receiver-Transmitter as outlined in "Disassembly Procedures." To remove a defective crystal, including the 1545 kc crystal, unsolder the crystal and clean the excess solder from the eyelets. Check the frequency and the pin alignment of the replacement crystal. Insert the crystal. Insert the crystal pins into the eyelets so that they just penetrate the thickness of the eyelets. Solder each crystal pin to the printed-circuit board, holding the pin with pliers between the solder joint and the crystal to form a heat sink. Do not remove the pliers until the heat from the solder joint has dissipated.

REPLACEMENT OF TUNING CAPACITOR.

A defective tuning capacitor, C101, requires the replacement of the entire capacitor assembly. To replace the capacitor assembly, disassemble the Receiver-Transmitter as described in "Disassembly Procedures."

DISASSEMBLY PROCEDURES.

This paragraph contains disassembly procedures for the Receiver-Transmitter. Obvious procedures, such as removal of electron tubes and unsoldering and resoldering of wires, are omitted. To supplement the disassembly procedures, refer to the wiring diagrams and the exploded view, Figure 1-19. Reassembly is the reverse of disassembly unless noted otherwise.

NOTE

Disassemble the Receiver-Transmitter only to the extent required for replacement of parts. Where removal and disassembly procedures are apparent from the exploded views, or upon inspection of the unit, no special instructions are included.

Front Plate and Knobs.

Step 1. Loosen two setscrews (2, Figure 1-19). Remove SQUELCH knob (1) and washer (3).

Step 2. Loosen two setscrews (2). Remove VOLUME knob (1) and washer (3).

Step 3. Remove screw (5) and washer (5A), and loosen two setscrews (6). Remove knob assembly (4) and two washers (6A and 6B).

Step 4. Loosen two setscrews (8) and remove dial (7).

Step 5. Remove four screws (10) and front plate (9).

Panel Assembly

Step 1. Remove the front plate and knobs as outlined in the previous procedure.

NOTE

If necessary, replace lamp as outlined in Step 5 of this procedure and paragraph "Replacement of Panel Lamp."

Step 2. Remove four screws (12, Figure 1-19). Loosen two setscrews (13) in spur gear (44) and one setscrew (13) in sleeve (88).

Step 3. Loosen two setscrews (14) on printed-circuit assembly (67) and two setscrews (14) on printed-circuit assembly (78).

Step 4. Remove panel assembly (11). Spur gear (44) will slide off shaft (42) when shaft is drawn through hub assembly (73).

NOTE

The procedures for disassembling the crystal printed-circuit assemblies, as outlined in the following procedure, "Crystal Printed-Circuit Assemblies," may be performed at this time.

Step 5. Unscrew collar (20) and remove lamp (19).

Step 6. Loosen four setscrews (16) and remove two spur gears (15).

Step 7. Loosen two setscrews (18) and remove spur

gear (17).

Step 8. Unscrew nut (22) and remove washers (23 and 24) and lamp holder (21).

Step 9. Remove four screws (26) and remove panel subassembly (25).

Step 10. Unscrew nut (28) and remove washer (29) and variable resistor R158 (27).

Step 11. Unscrew nut (31) and remove washer (32) and variable resistor R154 (30).

Step 12. Release two retaining rings (34) and remove shaft (33).

Step 13. Remove two springs (35) and release two retaining rings (37). Remove two strap assemblies (36) and two washers (38).

Step 14. Loosen four setscrews (40) and detach two cams (39).

Step 15. Remove two shafts (41 and 42) from panel assembly (43).

Crystal Printed-circuit Assemblies.

Step 1. Complete Steps 1 through 4 of previous "Panel Assembly" disassembly procedure.

NOTE

Each of the following steps removes a crystal printed-circuit assembly from the Receiver-Transmitter chassis. Replace the crystals mounted on the assemblies as described in "Replacement of Crystals."

Step 2. To detach printed-circuit assembly (67, Figure 1-19), remove screws (68, 69, and 71) and washer (70).

Step 3. To detach printed-circuit assembly (56), remove screws (57, 58, and 59) and two washers (60).

Step 4. To detach printed-circuit assembly (78), remove screw (79) and two screws (80), and two washers (81).

Inductor Printed-circuit Assemblies.

Step 1. Remove screw (91, Figure 1-24), washer (92), and terminal assembly (90). Remove four screws (92B) and four nuts (92C). Swing relay (92A) clear of chassis hole.

Step 2. Loosen ten setscrews (94) in printed-circuit assemblies (95, 100, and 103). Loosen one setscrew (89) in sleeve (88).

Step 3. Remove shaft (93) through hole normally occupied by relay (92A).

Step 4. Remove two screws (96), four washers (98), and four nuts (97). Remove printed-circuit assemblies (95 and 100) off mounting studs.

Step 5. Remove four screws (101) and four washers (102). Remove two printed-circuit assemblies (100) off mounting studs.

Step 6. Remove two screws (104) and two washers (105). Remove printed-circuit assembly (103) off mounting stud.

Step 7. Remove ten contacts (99), (two for each printed-circuit assembly) with tweezers. With screwdriver, gently pry wiper arm away from printed-circuit assembly.

Capacitor Assembly.

Step 1. Remove screws (107, 108, and 110, Figure 1-19) and two washers (109).

Step 2. Unsolder rear bracket and slide gang capacitor assembly (106) toward rear of chassis to disengage spur gear (44). Remove assembly.

Step 3. Loosen two setscrews (116) and remove gear assembly (115).

Step 4. Remove two screws (114) and shield (113).

LUBRICATION.

If the lubricant in the Receiver-Transmitter appears dry or dirty, or if there is an insufficient amount, remove the old lubricant with a clean cloth and apply fresh lubricant as directed in Figure 1-7.

EQUIPMENT PERFORMANCE AND TROUBLE ANALYSIS.

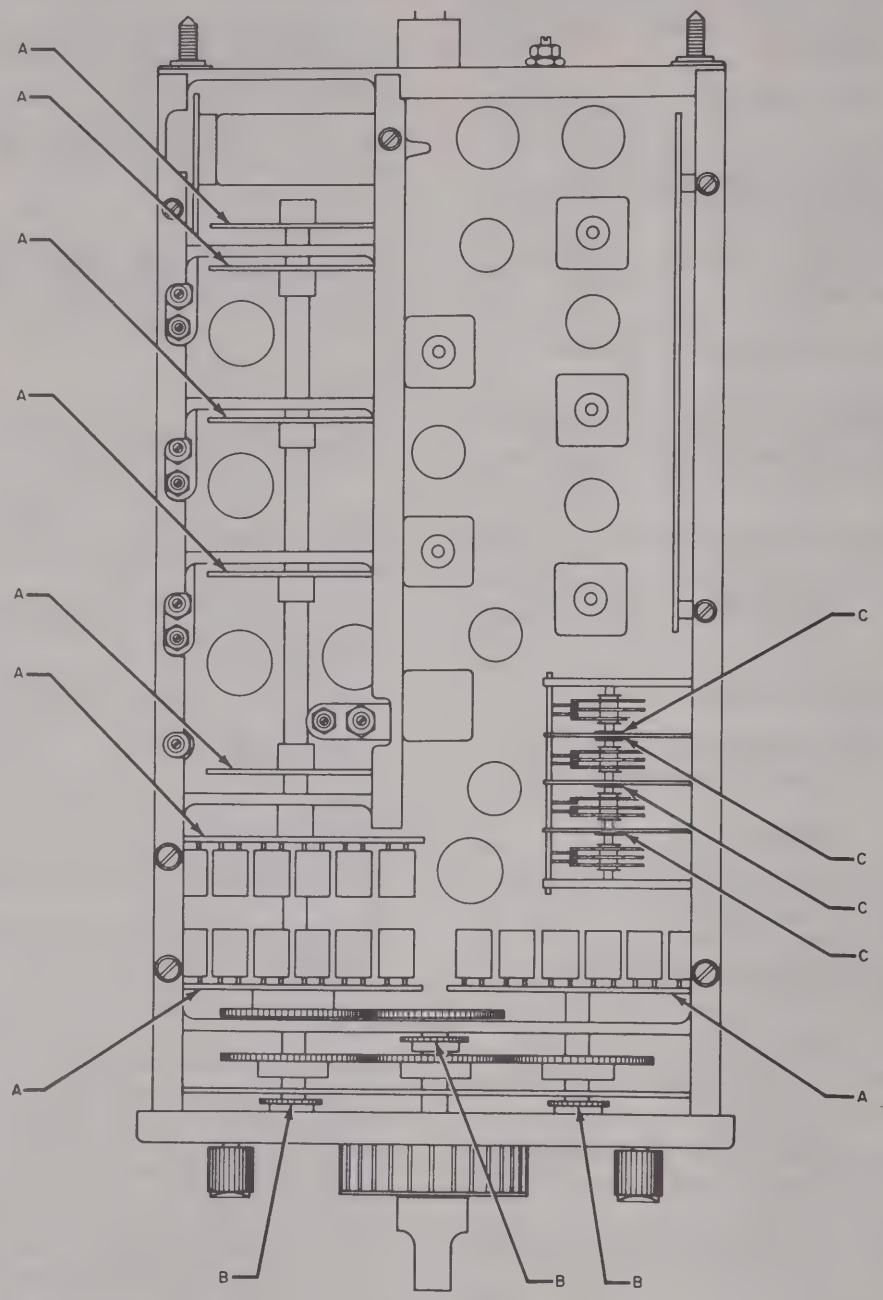
General.

Table 1-3 outlines the procedures necessary for checking the performance and trouble-shooting the Cessna Transceiver 500. The procedures for checking the equipment should be performed in the order listed, as some of the steps presuppose previous satisfactory results. The possible cause of an abnormal indication is localized to specific circuits or parts. Supplement the information given in Table 1-3 by referring to the applicable schematic and wiring diagrams. The bench test interconnection diagram is shown in Figure 1-8.

Signal Generator Output.

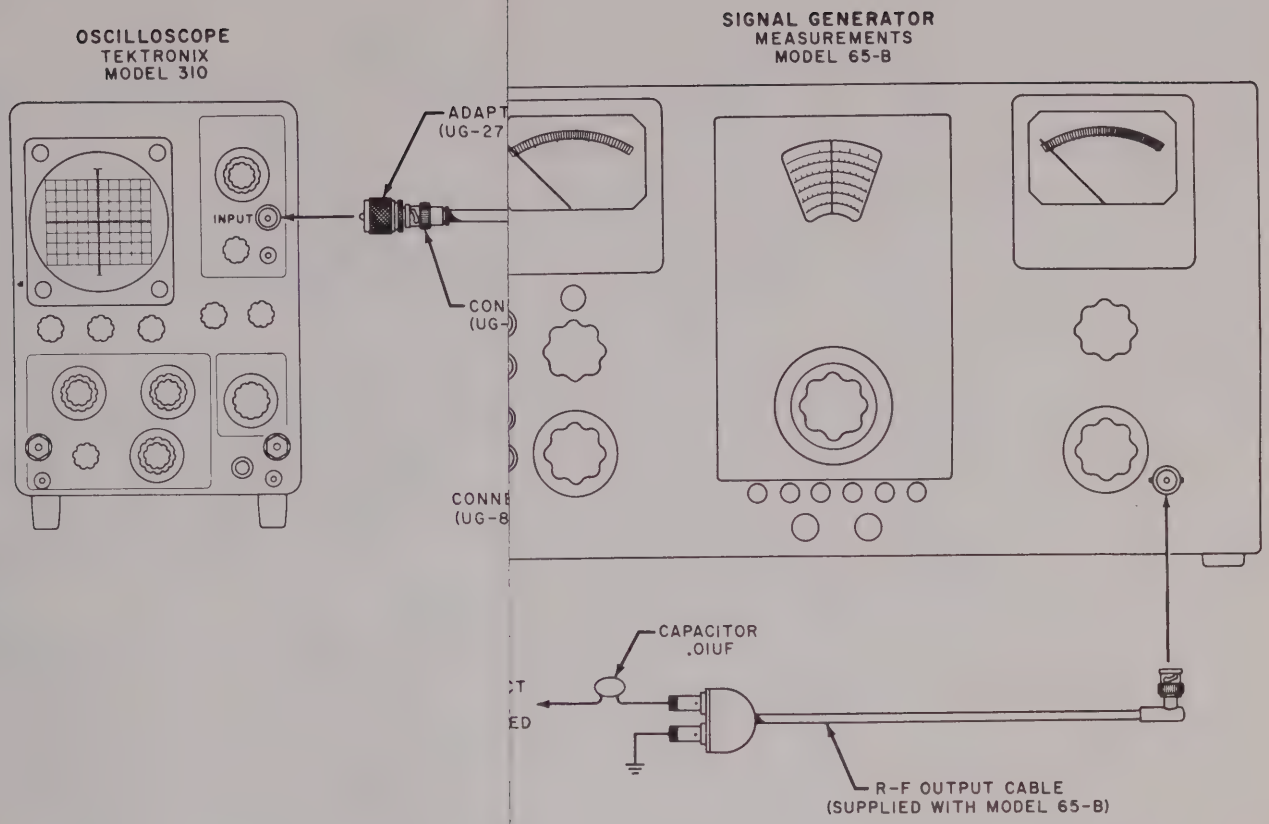
The method of connecting the receiver to the signal generator must be carefully considered to ensure proper interpretation of results. All signal generator output microvolt values given in the following procedures are in terms of hard* microvolts. When using the Boonton Radio Type 505-B 6 db attenuator, the attenuator dial of the signal generator reads hard microvolts directly. If the signal generator output is connected to the receiver without the use of the 6 db

* Hard microvolts are defined as equivalent open-circuit microvolts across a 50 ohm signal source.



Point of Lubrication	Part to be Lubricated	Lubrication Period	Kind of Lubricant	Method of Application
A	Printed Circuit Assembly	500 hours	Dow Corning DC-510 Silicone Fluid	Apply a small amount to both sides of printed circuit switches with artist's brush.
B	Detent Gear	500 hours	Aeroshell No. 7 Grease	Apply a small amount to each detent gear with artist's brush.
C	Capacitor Grounding Contacts	500 hours	Dow-Corning DC-510 Silicone Fluid	Apply a small amount to shaft contacts.

Figure 1-7. Receiver-Transmitter, Lubrication Diagram



NOTES:

1. FOR INTERCONNECTION OF RECEIVER-TRANSMITTER AND DYNAVERTER, SEE FIGURE 1-13.
2. IF HEADSET IS NOT USED, TERMINATE TERMINAL D OF J302 WITH A 300-OHM RESISTOR TO GROUND. IF SPEAKER IS NOT USED, TERMINATE TERMINAL 1 OF J301 WITH A 4-OHM RESISTOR TO GROUND.
3. CONNECT ALL UNITS OF BENCH TEST SET UP TO GROUND (LV-SOURCE)
4. CONNECTOR KIT 28808 USES AMPHENOL 126-807 INSERT.

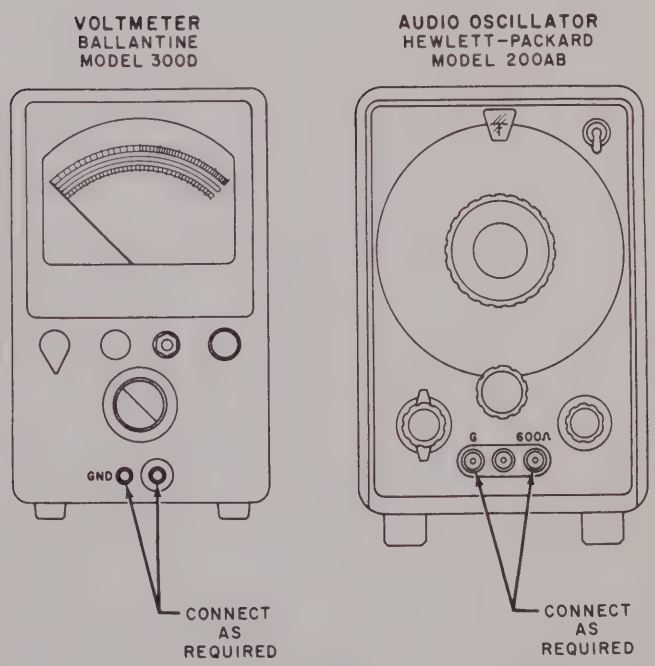
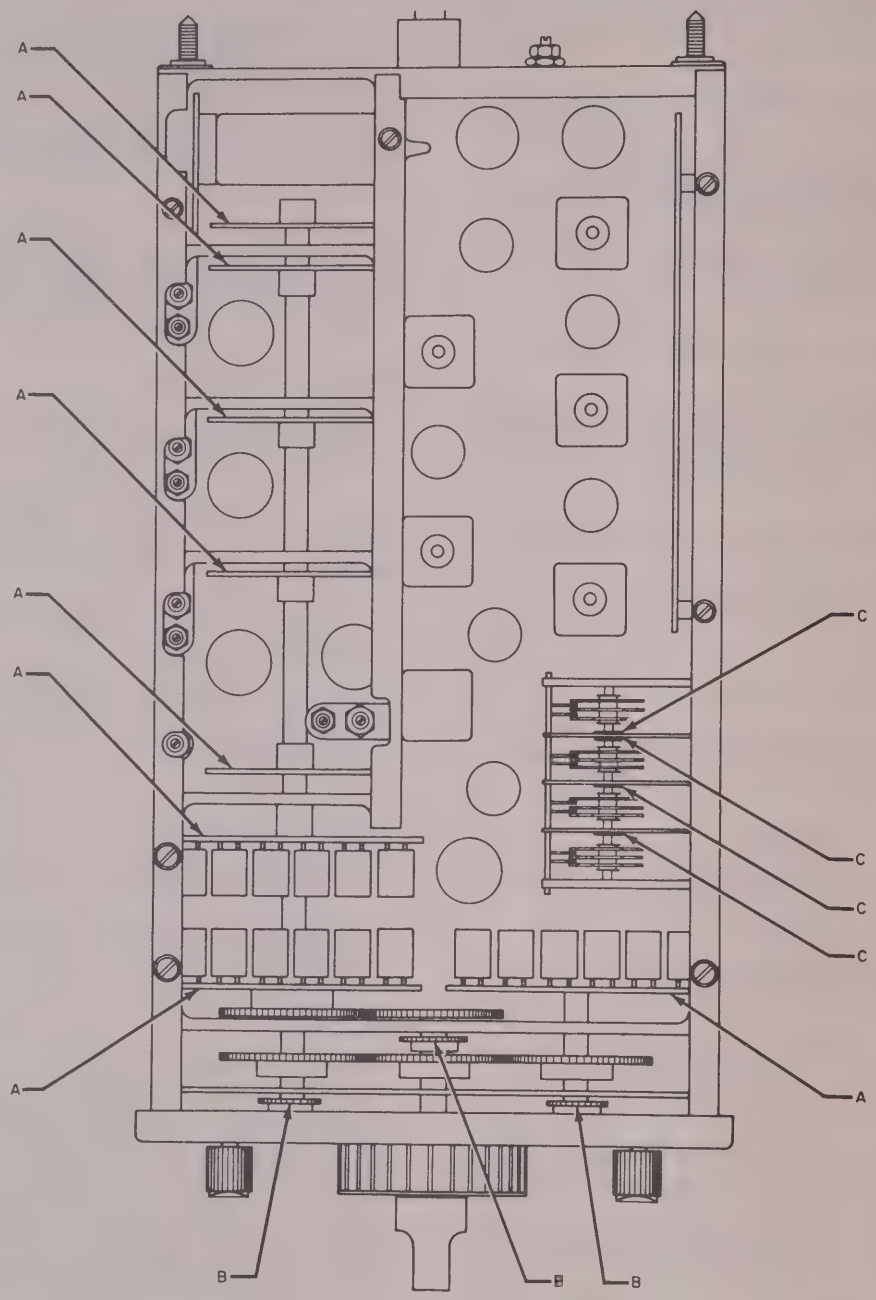
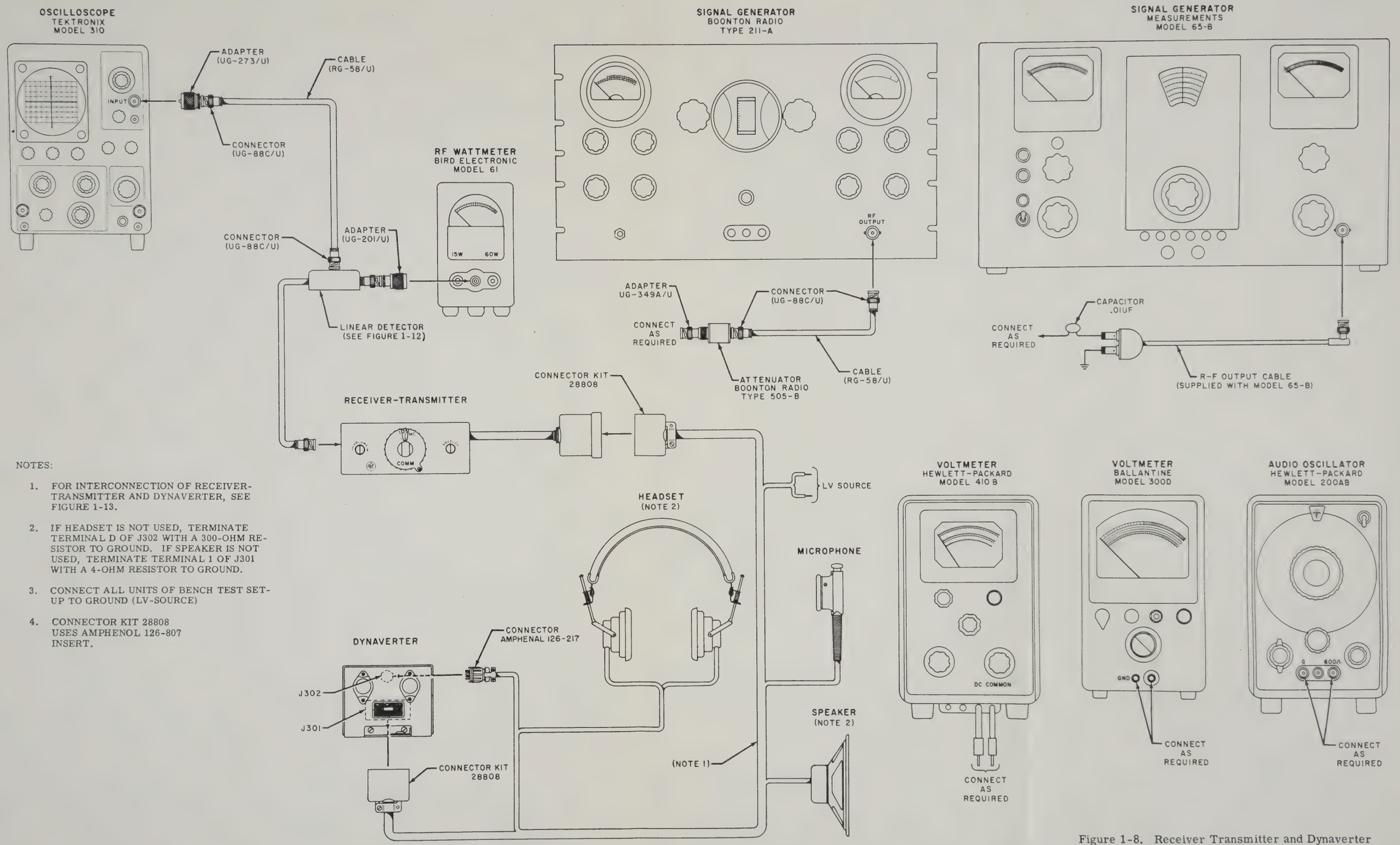


Figure 1-8. Receiver Transmitter and Dynaverter Bench Test Setup



Point of Lubrication	Part to be Lubricated	Lubrication Period	Kind of Lubricant	Method of Application
A	Printed Circuit Assembly	500 hours	Dow Corning DC-510 Silicone Fluid	Apply a small amount to both sides of printed circuit switches with artist's brush.
B	Detent Gear	500 hours	Aeroshell No. 7 Grease	Apply a small amount to each detent gear with artist's brush.
C	Capacitor Grounding Contacts	500 hours	Dow-Corning DC-510 Silicone Fluid	Apply a small amount to shaft contacts.

Figure 1-7. Receiver-Transmitter, Lubrication Diagram



NOTES:

1. FOR INTERCONNECTION OF RECEIVER-TRANSMITTER AND DYNAVERTER, SEE FIGURE 1-13.
2. IF HEADSET IS NOT USED, TERMINATE TERMINAL D OF J302 WITH A 300-OHM RESISTOR TO GROUND. IF SPEAKER IS NOT USED, TERMINATE TERMINAL 1 OF J301 WITH A 4-OHM RESISTOR TO GROUND.
3. CONNECT ALL UNITS OF BENCH TEST SET-UP TO GROUND (LV-SOURCE)
4. CONNECTOR KIT 28808 USES AMPHENOL 126-807 INSERT.

Figure 1-8. Receiver Transmitter and Dynaverter Bench Test Setup

TABLE 1-3. EQUIPMENT PERFORMANCE AND TROUBLE ANALYSIS

Step	Procedure	Normal Indication	Possible Causes of Abnormal Indication
	PRELIMINARY PROCEDURE		
1	Interconnect the units of the Cessna Transceiver 500 and test equipment as shown in Figure 1-8.	None.	None.
2	Turn on test equipment, LV power source, and the Receiver-Transmitter. Adjust the output voltage of the LV power source to 13.75 vdc (for 14-volt model) or 27.5 vdc (for 28-volt model). Let the Cessna Transceiver 500 equipment and the test equipment warm up for at least five minutes before proceeding.	Receiver-Transmitter tube filaments light.	Receiver-Transmitter VOLUME switch (S104), filament in Receiver-Transmitter tube, Dynaverter power relay (K302) and other filament circuit components.
	TRANSMITTER POWER OUTPUT		
3	Reduce the Hewlett-Packard Model 200AB Audio Oscillator output to 0 volts.	None.	None.
4.	Set the Receiver-Transmitter "MC SEL" and "FRACT MC SEL" switches to 118.00, 118.50, 118.95, 126.00, 126.50, 126.95, 135.00, 135.50, and 135.95 mc. After selecting each channel, set the microphone key switch on and note the reading on the Bird Electronic Model 61 Wattmeter.	Wattmeter indicates a minimum of 7 watts for each channel selected.	Transmitter tubes, antenna relay K101, and other transmitter circuit components. Improper alignment of Transmitter circuits.
	R-F MODULATION		
5.	Adjust the Hewlett-Packard Model 200AB for an output of 1 volt at 1000 cps.	None.	None.
6.	Set the microphone key switch on and note the pattern on the Tektronix Model 310 Oscilloscope.	Oscilloscope pattern indicates modulation greater than 85%.	Dynaverter transistors Q301, Q304, Q305, Q306, and Q307; microphone relay K301 and other circuit components. Improper setting of Dynaverter microphone control R307. Improper setting of Dynaverter clipping control R313.
7.	Increase the Model 200AB output to 2.5 volts at 1000 cps.	None.	None.
8.	Set the microphone key switch on and note the pattern on the Tektronix Model 310 Oscilloscope.	Model 310 pattern indicates modulation less than 100%.	Improper setting of Dynaverter clipping control.
	SENSITIVITY		
9.	Set the Receiver-Transmitter SQUELCH control to its maximum clockwise position.	None.	None.
10.	Connect the Ballantine Model 300 vtvm to terminal 16 of J301 on the Dynaverter.	None.	None.

TABLE 1-3. EQUIPMENT PERFORMANCE AND TROUBLE ANALYSIS - Continued

Step	Procedure	Normal Indication	Possible Causes of Abnormal Indication
	SENSITIVITY - Continued		
11.	Set the Receiver-Transmitter "MC SEL" and "FRACT MC SEL" switches to 135.50 mc.	None.	None.
12.	Disconnect the linear detector and connect the Boonton Radio Type 211-A Signal Generator to the Receiver-Transmitter antenna jack, J201. Turn the signal generator on and adjust the output for 3μv at 135.50 mc, 30% modulation, 1000 cps. CAUTION Avoid damage to the signal generator. Do not set the microphone key switch on when the Type 211-A Signal Generator is connected to the antenna jack.	None.	None.
13.	Adjust the Receiver-Transmitter VOLUME control for a reading of 20 db (1 volt) on the vtvm.	Model 300 vtvm indicates 20 db (1 volt).	None.
14.	Remove the 1000 cps modulation and note the db drop on the Model 300 vtvm. The db drop in signal output is the signal-to-noise ratio (S+N/N).	Model 300 vtvm indicates a drop of at least 6 db.	Improper alignment of r-f or i-f circuits. r-f, i-f, or a-f tubes, and other circuit components. Improperly adjusted i-f gain control R129.
15.	Repeat Steps 9 through 14 for each of the following frequencies: 118.00, 118.50, 126.00, 126.50, 126.95, 135.00, and 135.95 mc.	As noted.	Improper tracking of C101.
	AUTOMATIC GAIN CONTROL		
16.	Set the Receiver-Transmitter "MC SEL" and "FRACT MC SEL" switches to 135.50 mc.	None.	None.
17.	Adjust the Type 211-A Signal Generator for an output of 10μv at 135.50 mc with 30% modulation of 1000 cps.	None.	None.
18.	Adjust the Receiver-Transmitter VOLUME control for a reading of 1 volt on the vtvm.	None.	None.
19.	Slowly increase the signal generator output to 0.2 volt and note the vtvm reading.	Model 300 vtvm reading should increase from 1 v to 1.6 v.	Components in i-f and agc circuits.

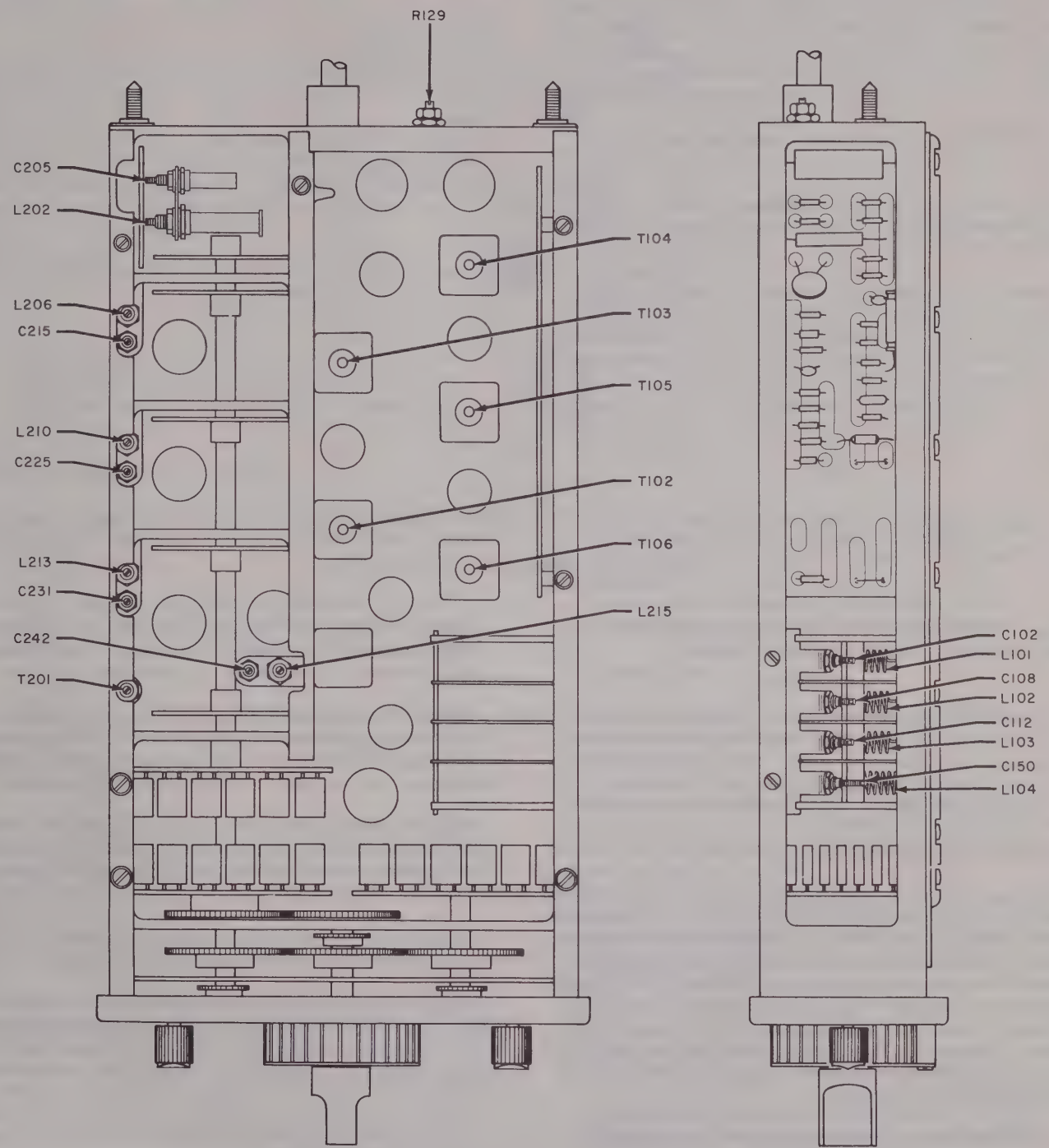


Figure 1-9. Receiver-Transmitter, Adjustments

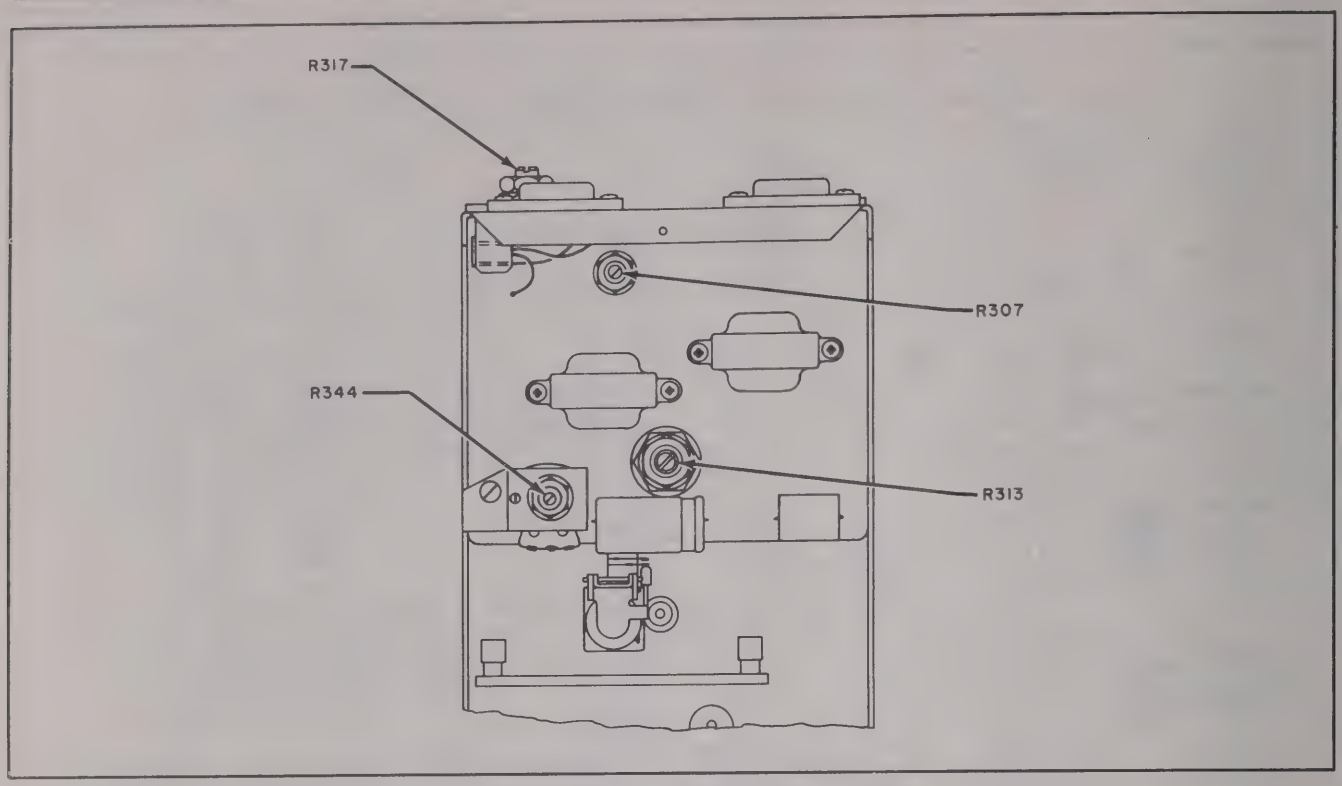


Figure 1-10. Dynaverter, Adjustments

pad, the attenuator dial reading must be doubled to give the correct hard microvolt reading.

CAUTION

When testing the transmitter, a 52 ohm dummy load must be connected to the Receiver-Transmitter antenna jack, J201. Care must be exercised that the transmitter is not keyed when a signal generator is connected to the antenna jack.

GENERAL ALIGNMENT INFORMATION.

The following four paragraphs describe the alignment and adjustment procedures for the Cessna Transceiver 500. After an alignment or adjustment procedure has been completed, the performance of the equipment should be checked as outlined in Table 1-3. The test equipment required for the procedures is listed in Table 1-1 and the interconnection of the bench test setup is shown in Figure 1-8. Figures 1-9 and 1-10 show the location of the adjustments in the Receiver-Transmitter and Dynaverter.

ALIGNMENT OF CHANNEL SELECTOR SWITCHES.

"MC SEL" Switch.

Step 1. Center the rotor of the transmitter megacycle crystal printed-circuit board on any contact other than the two lower middle contacts. Tighten the two rotor hub setscrews.

Step 2. Secure the knob of the "MC SEL" switch in any random position by tightening one of the setscrews.

Step 3. Rotate the "MC SEL" switch until the rotor of the transmitter megacycle crystal printed-circuit board selects the 105.176 mc crystal.

Step 4. Loosen the setscrew in the knob of the "MC SEL" switch and rotate the knob until "27" is centered in the upper portion of the frequency indicator. Tighten the two setscrews to secure the knob to its shaft.

Step 5. Center the rotor, on each of the five inductor printed-circuit boards, between the eyelets located on each side of the red dot. Tighten the two setscrews in each rotor hub.

Step 6. Set the "MC SEL" switch to center "18" in the upper portion of the frequency indicator.

Step 7. Loosen the two setscrews on the capacitor spur gear. Space the gear stop on the gear assembly 0.030 ±0.003 inch away from the stop on the capacitor frame. Tighten the two spur gear setscrews.

NOTE

Capacitor C101 is slightly unmeshed when Step 7 is completed.

Step 8. Center the rotor of the receiver megacycle crystal printed-circuit board on the 98.176 mc crystal contact. Tighten the two rotor hub setscrews.

"FRACT MC SEL" Switch.

Step 1. Center the rotor of the fractional megacycle crystal printed-circuit board on any contact other than the two lower middle ones. Tighten the two

rotor hub setscrews.

Step 2. Secure the knob of the "FRACT MC SEL" switch in any random position by tightening one of the knob setscrews.

Step 3. Rotate the "FRACT MC SEL" switch until the rotor of the fractional megacycle printed-circuit board selects the 22.774 mc crystal.

Step 4. Loosen the setscrew in the knob of the "FRACT MC SEL" switch and rotate the knob until "95" is centered in the lower portion of the frequency indicator. Tighten the two setscrews to secure the knob to its shaft.

ALIGNMENT OF TRANSMITTER CIRCUITS.

NOTE

The preliminary procedure outlined in Table 1-3 must be completed before any of the following alignment or adjustment procedures are begun.

Fractional Megacycle Oscillator.

Step 1. Connect the dc probe to the Hewlett-Packard Model 410B vtvm to TP4. Set the vtvm to read -1 volt full scale.

Step 2. Set the Receiver-Transmitter "FRACT MC SEL" switch to .95 mc. Depress the microphone switch and adjust the slug of T201 for a peak reading on the vtvm.

Step 3. Set the Receiver-Transmitter "FRACT MC SEL" switch to .00 mc. Depress the microphone switch and adjust the slug of T201 for a peak reading on the vtvm.

Step 4. Repeat Steps 2 and 3 until the voltage obtained for the .00 mc setting is at least 70% of the voltage obtained for the .95 mc setting. The vtvm should read at least -0.4 volt for a .00 or .95 mc switch setting.

Transmitter Megacycle Oscillator.

Step 1. Connect the dc probe of the Hewlett-Packard Model 410B vtvm to TP4. Set the vtvm to read -1 volt full scale.

Step 2. Set the Receiver-Transmitter "MC SEL" switch to 118 mc. Depress the microphone switch and adjust C242 for a peak reading on the vtvm.

Step 3. Set the Receiver-Transmitter "MC SEL" switch to 135 mc. Depress the microphone switch and adjust L215 for a peak reading on the vtvm.

Step 4. Repeat Steps 2 and 3 until no further peaking is noticed on the vtvm.

Step 5. Set the Receiver-Transmitter "MC SEL" switch to 118 mc. Depress the microphone switch and note the vtvm reading. Adjust C242 in a counterclockwise direction (reducing capacity) until the vtvm reads 85% of the reading noted in this step.

Step 6. Set the Receiver-Transmitter "MC SEL" switch to 135 mc. Depress the microphone switch and adjust L215 for a peak reading on the vtvm; note this reading. Adjust L215 in a clockwise direction (reducing inductance) until the vtvm reads 85% of the reading noted in this step.

Step 7. Repeat Steps 5 and 6 to verify that vtvm reads 85% of peak readings.

Step 8. At each position of Receiver-Transmitter "MC SEL" switch, note reading on vtvm; reading should be greater than -0.1 volt ac at each position.

Step 9. Insert a screwdriver between the transmitter megacycle oscillator, V103, and its associated tank circuit. At each position of the "MC SEL" switch the oscillator output should be at least 10% above the reading noted in Step 8. If necessary, readjust C242 or L215, or both, to satisfy this requirement.

NOTE

The oscillator may be detuned, as necessary, on the high-frequency side of the peak to achieve the result noted in Step 9. Excessive detuning, resulting in unstable low-voltage operation and frequency instability, is not normal and indicates a circuit malfunction.

Balanced Mixer.

Step 1. Connect the d-c probe of the Hewlett-Packard Model 410B vtvm to TP5. Set the vtvm to read -1 volt full scale.

Step 2. Set the Receiver-Transmitter "MC SEL" and "FRACT MC SEL" switches to 135.50 mc. Depress the microphone switch and adjust L213 for a peak reading on the vtvm.

Step 3. Set the Receiver-Transmitter "MC SEL" and "FRACT MC SEL" switches to 118.50 mc and, using an insulated tuning tool, adjust C231 for a peak reading on the vtvm.

NOTE

Detuning of the circuit will occur when the insulated tuning tool is removed from C231. To compensate, peak C231, then detune in a counterclockwise direction enough to equalize the detuning caused by the tuning tool.

Step 4. Repeat Steps 2 and 3 until no further peaking is noticed on the vtvm. The vtvm should read at least -0.4 volt for a 118.50 mc switch setting and at least -0.7 volt for a 135.50 mc switch setting.

Buffer Amplifier.

Step 1. Connect the dc probe of the Hewlett-Packard Model 410B vtvm to TP6. Set the vtvm to read

-10 volts full scale.

Step 2. Set the Receiver-Transmitter "MC SEL" and "FRACT MC SEL" switches to 135.50 mc. Depress the microphone switch and adjust L210 for a peak reading on the vtvm.

Step 3. Set the Receiver-Transmitter "MC SEL" and "FRACT MC SEL" switches to 118.50 mc. Depress the microphone switch and adjust C225 for a peak reading on the vtvm.

Step 4. Repeat Steps 2 and 3 until no further peaking is noticed on the vtvm. The vtvm should read at least -8 volts for a 118.50 or 135.50 mc switch setting.

Driver and Power Amplifiers.

Step 1. Connect the dc probe of the Hewlett-Packard Model 410B vtvm to TP7. Set the vtvm to read - 100 volts full scale.

Step 2. Set the Receiver-Transmitter "MC SEL" and "FRACT MC SEL" switches to 135.50 mc. Depress the microphone switch and adjust L206 for a peak reading on the vtvm. Adjust L202 for a peak reading on the Bird Electronic Model 61 r-f Wattmeter.

Step 3. Set the Receiver-Transmitter "MC SEL" and "FRACT MC SEL" switches to 118.50 mc. Depress the microphone switch and adjust C215 for a peak reading on the vtvm. Adjust C205 for a peak reading on the wattmeter.

Step 4. Repeat Steps 2 and 3 until no further peaking is noticed on the vtvm and wattmeter. The vtvm should read at least - 60 volts for a 118.50 or 135.50 mc switch setting.

Final Adjustments.

Step 1. Connect the dc probe of the Hewlett-Packard Model 410B vtvm to TP7. Set the vtvm to read - 100 volts full scale.

Step 2. Set the Receiver-Transmitter "MC SEL" and "FRACT MC SEL" switches to 118.50 mc. Depress the microphone switch and adjust C215, C225, and C231 (with an insulated tuning tool) for a peak reading on the vtvm. Adjust C205 for a peak reading on the Bird Electronic Model 61 r-f Wattmeter.

Step 3. Set the Receiver-Transmitter "MC SEL" and "FRACT MC SEL" switches to 118.50 mc. Depress the microphone switch and adjust L206, L210, and L213 for a peak reading on the vtvm. Adjust L202 for a peak reading on the wattmeter.

Step 4. Repeat Steps 2 and 3 until no further peaking is noticed on the wattmeter.

Step 5. Set the Receiver-Transmitter "MC SEL" and "FRACT MC SEL" switches to 118.00, 118.95, 135.00, and 135.95 mc and note the wattmeter reading for each position. Wattmeter should read at least 7 watts for each switch position.

ALIGNMENT OF MODULATOR CIRCUITS.

NOTE

The preliminary procedure outlined in Table 1-3 must be completed before the following alignment or adjustment procedures are begun.

Step 1. Connect the Hewlett-Packard Model 200AB Audio Oscillator to terminal 3 of P301 on the Dynaverter. Adjust the audio output for 1 volt at 1000 cps.

Step 2. Depress the microphone switch and observe the Tektronix Model 310A Oscilloscope modulation pattern. Set the Dynaverter clipper control, R313, for zero clipping. Adjust the Dynaverter microphone gain control. R307, for approximately 90% modulation.

Step 3. Increase the audio output voltage to 2.5 volts. Readjust the clipping control so that modulation level does not exceed 100%.

ALIGNMENT OF RECEIVER CIRCUITS.

NOTE

The preliminary procedure outlined in Table 1-3 must be completed before any of the following alignment or adjustment procedures are begun.

i-f Circuits.

Step 1. Connect the dc probe of the Hewlett-Packard Model 410B vtvm to TP3. Set the vtvm to read - 10 volts full scale.

Step 2. Connect the Measurements Model 65-B Signal Generator to the grid (pin 1) of V107. Set the signal generator output for 455 kc with a 30% modulation of 1000 cps. Adjust the output voltage level until the vtvm indicates a signal present at TP3.

Step 3. Tune the primary winding (top slug) and secondary winding (bottom slug) of T106 using the i-f tuning tool shown in Figure 1-3. Place the i-f tuning tool across the secondary winding and tune the primary winding. Reverse this procedure for tuning the secondary winding.

NOTE

The i-f transformers used in the receiver are overcoupled; therefore, the peak output (for any alignment and adjustment which includes the receiver i-f circuits) is defined as the valley between the two output peaks.

Step 4. Set the i-f gain control, R129, to its maximum clockwise position and repeat Steps 2 and 3, connecting the signal generator to the grid (pin 1) of the V106 and tuning T105.

Step 5. Repeat Steps 2 and 3, connecting the signal generator to the grid (pin 7) of V105 and tuning T104.

Step 6. Reconnect the signal generator to the grid (pin 1) of V104 and adjust the output for 2.0 mc, modulated 30% at 1000 cps. Adjust the output voltage level until the vtvm indicates a signal present at TP3.

Step 7. Using the i-f tuning tool, tune the primary and secondary windings of T103.

Step 8. Repeat Steps 6 and 7, connecting the signal generator to the grid (pin 2) of V103 and tuning T102.

Receiver Megacycle Oscillator.

NOTE

The Receiver-Transmitter bottom shield plate and top shield screen must be in place before proceeding with the alignment and adjustment of the receiver megacycle oscillator.

Step 1. Connect the dc probe of the Hewlett-Packard Model 410B vtvm to TP1. Set the vtvm to read - 1 volt full scale.

Step 2. Set the "MC SEL" and "FRACT MC SEL" switches to 135.50 mc. Set the trimmer capacitor, C150, to its midposition and adjust L104 for a peak reading on the vtvm.

NOTE

The complete alignment procedure need be performed only if the capacitor assembly has been replaced. If oscillator alignment is necessary because of tube replacement, proceed with Steps 4 and 6.

Step 3. Adjust inductor L104 for a peak reading on the vtvm. Set the "MC SEL" switch to 118 mc and determine which end of the tuning wand restores a peak reading on the vtvm. If the oscillator needs less capacity, proceed with Step 4. If the oscillator needs more capacity, readjust L104 until a peak reading is indicated on the vtvm.

Step 4. Position the "MC SEL" switch at 135 mc. Adjust C150 for a peak reading on the vtvm.

Step 5. Rotate the "MC SEL" switch from 135 to 118 mc. Note that the receiver megacycle oscillator voltage is present at TP1 for each channel selected. If the voltage decreases, bend the rotor plates of C101C until all channnels show a peak reading on the vtvm. Be sure that all bending of the rotor plates is in a direction of less capacity. If at any time a need for more capacity is indicated, restart the alignment procedure with Step 3.

Step 6. Set the "MC SEL" switch to 135 mc. Reduce capacity of C150 until vtvm reading is 90% of the peak reading of Step 4.

Step 7. Set the "MC SEL" switch to 118 mc and spread the turns of L104 until vtvm reading is 90% of the peak reading of Step 3.

Step 8. Check Steps 6 and 7 by inserting the iron tip of a tuning wand into L104. The output should increase as the tuning wand is inserted. If necessary, repeat Steps 6 and 7.

Step 9. At each position of "MC SEL" switch note reading on vtvm; reading should be greater than 0.8 volt ac at each position.

Step 10. Insert the iron tip of a tuning wand into L104. At each position of the "MC SEL" switch, the oscillator output should be at least 10% above the reading noted in Step 9, If necessary, readjust C150 or L104, or both, until this requirement is met.

NOTE

The oscillator may be detuned, as necessary, on the high-frequency side of the peak to achieve the result noted in Step 10. Excessive detuning, resulting in unstable low-voltage operations and frequency instability, is not normal and indicates a circuit malfunction.

Receiver r-f Circuits.

Step 1. Connect the dc probe of the Hewlett-Packard Model 410B vtvm to TP3. Set the vtvm to read - 10 volts full scale.

Step 2. Set the Receiver-Transmitter "MC SEL" and "FRACT MC SEL" switches to 135.50 mc.

Step 3. Connect the Boonton Radio Type 211-A Signal Generator to the Receiver-Transmitter antenna jack, J201. Set the signal generator output for 135.50 mc with 30% modulation of 1000 cps and adjust the signal generator output level until the vtvm indicates a signal present at TP3.

CAUTION

Avoid damage to the signal generator. Do not set the microphone key switch on when the Type 211-A is connected to the Receiver-Transmitter antenna jack, J201.

Step 4. Install a 22 $\mu\mu$f capacitor between the stator of C101C and ground. Adjust the trimmer capacitors, C102 (r-f amplifier grid), and C112 (first mixer grid) for a peak reading on the vtvm.

Step 5. Set the Receiver-Transmitter "MC SEL" and "FRACT MC SEL" switches to 118.50 mc and set the signal generator output for 118.50. Adjust L101 (antenna) and L103 (first mixer grid) for a peak reading on the vtvm.

Step 6. Repeat Steps 2 through 5 until no further peaking is noticed on the vtvm.

Step 7. Disconnect the 22 $\mu\mu$f capacitor and reinstall it between the stator of capacitor C101B and ground. Set the Receiver-Transmitter "MC SEL" and "FRACT MC SEL" switches to 135.50 mc. Ad-

just the signal generator output for 135.50 mc and adjust the trimmer capacitor, C108 (r-f amplifier plate), for a peak reading on the vtvm.

Step 8. Set the Receiver-Transmitter "MC SEL" and "FRACT MC SEL" switches, and the signal generator output to 118.50 mc. Adjust L102 (r-f amplifier plate) for a peak reading on the vtvm.

Step 9. Repeat Steps 7 and 8 until no further peaking is noticed on the vtvm.

Step 10. Disconnect the 22 $\mu\mu$f capacitor. Set the Receiver-Transmitter "MC SEL" and "FRACT MC SEL" switches and the signal generator output to 135.50. Adjust trimmer capacitor C112 (first mixer grid) for a peak reading on the vtvm.

i-f Gain Control Adjustment.

Step 1. Connect the dc probe of the Hewlett-Packard Model 410B vtvm to the junction of R156 and R166. Set the vtvm to read - 10 volts full scale.

Step 2. Connect the Measurements Model 65-B Signal Generator to the grid (pin 1) of V104. Set the signal generator output for 1200μv at 2.0 mc with 30% modulation of 1000 cps.

Step 3. Adjust the Receiver-Transmitter i-f gain control, R129, for a reading of - 5 volts on the vtvm.

VOLTAGE AND RESISTANCE MEASUREMENTS.

Tables 1-4 through 1-7 list typical voltage, resistance, level and stage gain measurements for the Cessna Transceiver 500. These measurements were made under the conditions noted in each table.

TABLE 1-4. VOLTAGE MEASUREMENTS

Conditions:

1. Equipment connected as shown in Figure 1-8. Preliminary procedure outlined in Table 1-3 applies.
2. Channel selector switches set to 118.00 mc.
3. No r-f input under receive conditions; no modulation of r-f carrier under transmit conditions.
4. Set Receiver-Transmitter SQUELCH control to its full clockwise position.
5. All measurements made with a 20,000 ohms-per-volt voltmeter, such as Simpson Model 260. All voltages are positive dc unless otherwise noted, and are measured with respect to ground.
6. Heater voltages shown in parentheses are for 14-volt models.
7. Terminals designated NC = no connection.

TABLE 1-4. VOLTAGE MEASUREMENTS - Continued

RECEIVER-TRANSMITTER TUBE SOCKET TERMINAL VOLTAGES

Tube	Pin No.	Scale	Voltage*
V101 (5654)	1	2.5	0.15
	2	2.5	1.95
	3	50.	13.75
	4	10.	6.8
	5	250.	240.
	6	250.	110.
	7	2.5	1.95
V102 (5654)	1	2.5	0.15
	2	10.	5.
	3	2.5	0
	4	10.	6.7
	5	250.	125.
	6	250.	110.
	7	10.	5.0
V103 (6922)	1	1000.	260.
	2	2.5	0
	3	50.	11.5
	4	50.	13.75
	5	10.	6.7
	6		—**
	7	10.	-3.6(T)
	8	2.5	0
	9	2.5	0
V104 (5749)	1	2.5	0.15
	2	2.5	0
	3	10.	6.9
	4	50.	13.75
	5	250.	120.
	6	250.	121.
	7	10.	7.3
V105 (5750)	1	50.	-13.
	2	10.	3.2
	3	50.	13.75
	4	10.	6.8
	5	1000.	290.
	6	250.	63.
	7	2.5	0
V106 (5749)	1	2.5	0.20
	2	2.5	0
	3	10.	6.8
	4	2.5	0
	5	250.	117.
	6	250.	117.
	7	10.	4.8
V107 (6136)	1	2.5	0
	2	2.5	0
	3	10.	6.7
	4	2.5	0
	5	1000.	325.
	6	250.	117.
	7	10.	3.1
V108 (5670)	1	10.	6.8
	2		—**
	3		—**
	4	250.	95.
	5	2.5	0
	6	250.	155.
	7		—**
	8		—**
	9	50.	13.75
V109 (5814A)	1	1000.	265.
	2	2.5	0
	3	50.	14.
	4	50.	13.75
	5	2.5	0
	6	1000.	265.
	7	2.5	0
	8	50.	14.
	9	10.	6.7
V110 (5751)	1	250.	200.
	2	250.	117.
	3	250.	130.
	4	2.5	0
	5	2.5	0
	6	250.	122.
	7	10.	2.8
	8	50.	18.8
	9	10.	6.8
V201 (7551)	1	2.5	0(T)
	2		—**
	3	1000.	260.(T)
	4	50.	13.75(T)
	5	2.5	0(T)
	6	100.	320.(T)
	7	2.5	0(T)
	8	1000.	260.(T)
	9	2.5	0(T)

TABLE 1-4. VOLTAGE MEASUREMENTS - Continued

RECEIVER-TRANSMITTER TUBE SOCKET TERMINAL VOLTAGES - Continued

Tube	Pin No.	Scale	Voltage*
V202 (5686)	1	10.	5.8(T)
	2		— **
	3	10.	5.8(T)
	4	10.	6.8(T)
	5	50.	13.75(T)
	6	250.	225.(T)
	7	1000.	295.(T)
	8	10.	5.8(T)
	9	250.	225.(T)
V203 (6688)	1	2.5	2.3(T)
	2		— **
	3	2.5	2.3(T)
	4	10.	6.8(T)
	5	2.5	0(T)
V203 (cont)	6	2.5	0(T)
	7		— **
	8	2.5	2.3(T)
	9	250.	132.(T)
V204 (6922)	1		— **
	2		— **
	3	10.	2.4(T)
	4	10.	6.8(T)
	5	2.5	0(T)
	6		— **
	7		— **
	8	10.	2.4(T)
	9	2.5	0(T)

DYNAVERTER TRANSISTOR TERMINAL VOLTAGES

Transistor	Pin No.	Scale	Voltage*
Q301	B	10.	3.2(T)
	E	10.	3.4(T)
	C	2.5	0.3(T)
Q302	B	50.	12.75(T)
	C	2.5	0(T)
	E	50.	13.75(T)
Q303	B	50.	12.75(T)
	C	2.5	0(T)
	E	50.	13.75(T)
Q304	B	50.	13.5(T)
	C	10.	7.8(T)
	E	50.	13.5(T)
Q305	B	50.	13.5(T)
	C	10.	7.8(T)
	E	50.	13.5(T)
Q306	B	50.	13.5(T)
	C	2.5	0(T)
	E	50.	13.2(T)
Q307	B	50.	13.5(T)
	C	2.5	0(T)
	E	50.	13.2(T)

RECEIVER-TRANSMITTER CHASSIS CONNECTOR TERMINAL VOLTAGES

Connector	Pin No.	Scale	Voltage*
P101	1	50.	13.75
	2	250.	-85.(T) / -28.
	3	NC	NC
	4	250.	150.(T) / 165.
	5	250.	126.
	6	250.	150.(T)
	7	1000.	260.
	8	1000.	305.(T)
	9	1000.	335.
P101 (cont)	10	2.5	0
	11	1000.	280.(T)
	12	50.	13.75
	13	2.5	0
	14	50.	0-13.75
	15	NC	NC
	16	1000.	260.(T)
	17	50.	13.75
	18	2.5	0
	19	2.5	0
	20	2.5	0

TABLE 1-4. VOLTAGE MEASUREMENTS- Continued

DYNAVERTER CHASSIS CONNECTOR TERMINAL VOLTAGES

Connector	Pin No.	Scale	Voltage*
J301	1	2.5	0
	2	25.	13.75
	3	50.	13.
	4	250.	126.
	5	1000.	260. (T)
	6	250.	150.
	7	1000.	260.
	8	1000.	280. (T)
	9	2.5	0
	10	1000.	335.
	11	250.	150. (T) 165.
	12	1000.	305. (T)
	13	2.5	0
	14	2.5	0
J301 (cont)	15	2.5	0
	16	2.5	0
	17	50.	13.75
	18	2.5	0
	19	50.	13.75
	20	2.5	0
J302	A	2.5	0
	B	250.	-85. (T) -28.
	C	NC	NC
	D	2.5	0
	E	NC	NC
	F	NC	NC
	H	NC	NC

*Voltages marked (T) are made during a transmit condition. All other voltages are made during a receive condition.

**No significant measurement can be made.

TABLE 1-5. RECEIVER-TRANSMITTER RESISTANCE MEASUREMENTS

Conditions:

1. All cables disconnected from Receiver-Transmitter.
2. Controls on Receiver-Transmitter front panel set as follows: SQUELCH, full counterclockwise; VOLUME, full clockwise.
3. All measurements made from pin indicated to chassis ground. Negative ohmmeter probe grounded.
4. All resistance values are in ohms. Multiplier K = 1000; M = 1,000,000.
5. Terminals designated NC = no connection.
6. Heater resistances shown are for 14-volt models.

TUBE SOCKET TERMINAL RESISTANCES

Tube	Pin No. 1	2	3	4	5	6	7	8	9
V101*	460K	180	1.7	3	∞	90K	180	—	—
V102*	350K	1.2K	0	3	85K	110K	1.2K	—	—
V103	∞	0	2.2K	2	3.6	20K	22K	0	0
V104*	115K	0	3.5	1.6	85K	85K	1.5K	—	—
V105*	12K	680	1.8	2	∞	∞	2.6	—	—
V106*	110K	0	2	0	85K	85K	680	—	—
V107*	20	0	2	0	∞	85K	2.2K	—	—
V108	3	0	20K	85K	0	∞	100K	0	1.5
V109	∞	390K	750	1.5	3	∞	390K	750	4.5

TABLE 1-5. RECEIVER-TRANSMITTER RESISTANCE MEASUREMENTS - Continued

TUBE SOCKET TERMINAL RESISTANCES - Continued

Tube	Pin No. 1	2	3	4	5	6	7	8	9
V110	3	7K	500K	370K	3	3	85K	600K	∞
V201	0	∞	∞	1.5	0	∞	0	∞	0
V202	100	3.5K	100	1.8	1.8	∞	∞	100	∞
V203	100	4.7K	100	3	3	∞	14K	100	18K
V204	26K	60K	220	3.6	3.0	26K	60K	220	0

*Tube base contains seven terminals.

P101 TERMINAL RESISTANCES

Terminal	Ohms	Terminal	Ohms	Terminal	Ohms	Terminal	Ohms
1	45	6	120	11	∞	16	∞
2	∞	7	∞	12	1.5	17	0
3	NC	8	∞	13	0	18	0
4	∞	9	∞	14	300	19	0
5	90K	10	3	15	NC	20	0

TABLE 1-6. VOLTAGE LEVEL MEASUREMENTS

Conditions:

1. Equipment connected as shown in Figure 1-8. Preliminary procedure outlined in Table 1-3 applies.
2. All voltage measurements made with a vtvm, such as the Hewlett-Packard Model 410B.
3. Receiver and modulator (receive condition) audio level measurements are measured with Boonton Radio Type 211-A Signal Generator connected to Receiver-Transmitter antenna jack, J201; adjusted for an output of 200μv at 135.50 mc, unless otherwise noted; and modulated 30% at 1000 cps. Receiver-Transmitter VOLUME control set to maximum clockwise position.
4. All resistance values are in ohms. Multiplier K = 1000; M = 1,000,000.
5. Modulator voltages measured with Hewlett-Packard Model 200AB Audio Oscillator connected to Dynaverter audio input (terminal 3 of J301) and adjusted for output of 0.1 volt at 1000 cps.

RECEIVER-TRANSMITTER OSCILLATOR R-F VOLTAGES

Oscillator	Frequency (mc)	Test Point	Voltage
Receiver megacycle	118-135	Pin 7, V102	2.8-3.8
Transmitter megacycle	118-135	Pin 6, V103	0.8-3.0
Fractional megacycle	.00-.95	Pin 2, V103	2.0-4.0

TABLE 1-6. VOLTAGE LEVEL MEASUREMENT - Continued

RECEIVER-TRANSMITTER TEST POINT VOLTAGES
(Refer to Conditions 3 and 4)

Test Point	Frequency (mc)	Voltage (minimum)
TP1*	—	—
TP2*	—	—
TP3*	—	—
TP4 (balanced mixer grid)	118.00-135.95**	-0.5
TP5 (buffer amplifier grid)	118.00-135.95**	-0.4
TP6 (driver amplifier grid)	118.00-135.95**	-8.
TP7 (power amplifier grid)	118.00-135.95**	-60.

* Test points 1, 2, and 3 are shown on schematic diagram (Figures 1-12 and 1-13).
** Select all megacycle channels, and then all fractional megacycle channels.

RECEIVER AUDIO LEVEL MEASUREMENTS
(Refer to Condition 3)

Test Point	Voltage
Pin 2, V110 (first audio amplifier grid)	0.12
Pin 1, V110 (first audio amplifier plate)	6.5
Pins 2 and 7, V109 (audio output amplifier grid)	6.5
Pins 1 and 6, V109 (audio output amplifier plate)	45.

DYNAVERTER MODULATOR AUDIO LEVEL MEASUREMENTS
(Refer to Conditions 3 and 5)

Transistor	Test Point	Voltage	
		Transmit	Receive
Q301 (microphone amplifier)	C	0.14	0
Q304 (driver amplifier)	C	3.6	3.7
Q305 (driver amplifier)	C	3.6	3.7
Q306 (output amplifier)	E	8.6	9.9
Q307 (output amplifier)	E	8.6	9.9

TABLE 1-7. STAGE GAIN MEASUREMENTS

Conditions:

1. Equipment connected as shown in Figure 1-8. Preliminary procedure outlined in Table 1-3 applies.

2. Receiver-Transistor channel selector switches set to 118.00 mc.

3. 455 kc, 2.0 mc, and 20 mc i-f signals supplied by Measurements Model 65-B Signal Generator, or equivalent. The signal is coupled through a .01 μf capacitor to all measuring points and the ground lead of the signal generator is connected to the Receiver-Transmitter chassis.

4. The input shown for the 455 kc, 2.0 mc, and 20 mc signals is the signal level required to obtain 5 volts between TP3 and chassis ground. This voltage is metered by a dc vacuum tube voltmeter, such as Hewlett-Packard Model 410B.

5. 118.00 mc r-f signal is supplied by Boonton Radio Type 211-A Signal Generator, or equivalent. The signal is coupled through a 6 db attenuator, such as a Boonton Radio Type 505B, to all measuring points and the ground lead of the signal generator is connected to the Receiver-Transmitter chassis.

6. Input shown for 118.00 mc signal is the signal level required to obtain 5 volts between TP3 and chassis ground. This voltage must be metered by a dc vacuum tube voltmeter, such as a Hewlett-Packard Model 410B.

TABLE 1-7. STAGE GAIN MEASUREMENTS - Continued

Signal Input			
Tube	Pin No.	Voltage	Conditions
455 kc i-f			
V107 (second amplifier) V106 (first amplifier) V105 (third mixer)	1 1 7	2.2v 83 mv 20 mv	1, 2, 3, and 4
2.0 mc i-f			
V105 (third mixer) V104 (amplifier) V103A (second mixer)	7 1 2	23 mv 2.7 mv 740 μv	1, 2, 3, and 4
20 mc i-f			
V103 (second mixer) V102 (first mixer)	2 1	320 μv 110 μv	1, 2, 3, and 4
118.00 mc r-f			
V102 (first mixer) V101 (r-f amplifier) J201 (antenna jack)	1 1 —	180 μv 140 μv 180 μv	1, 2, 5, and 6

CESSNA TRANSCEIVER 500

Diagrams

Figure 1-11. Cessna Transceiver 500, Interconnection Diagram

Figure 1-12. Receiver-Transmitter, Schematic Diagram

Figure 1-13. Receiver-Transmitter, Main Assembly Wiring Diagram

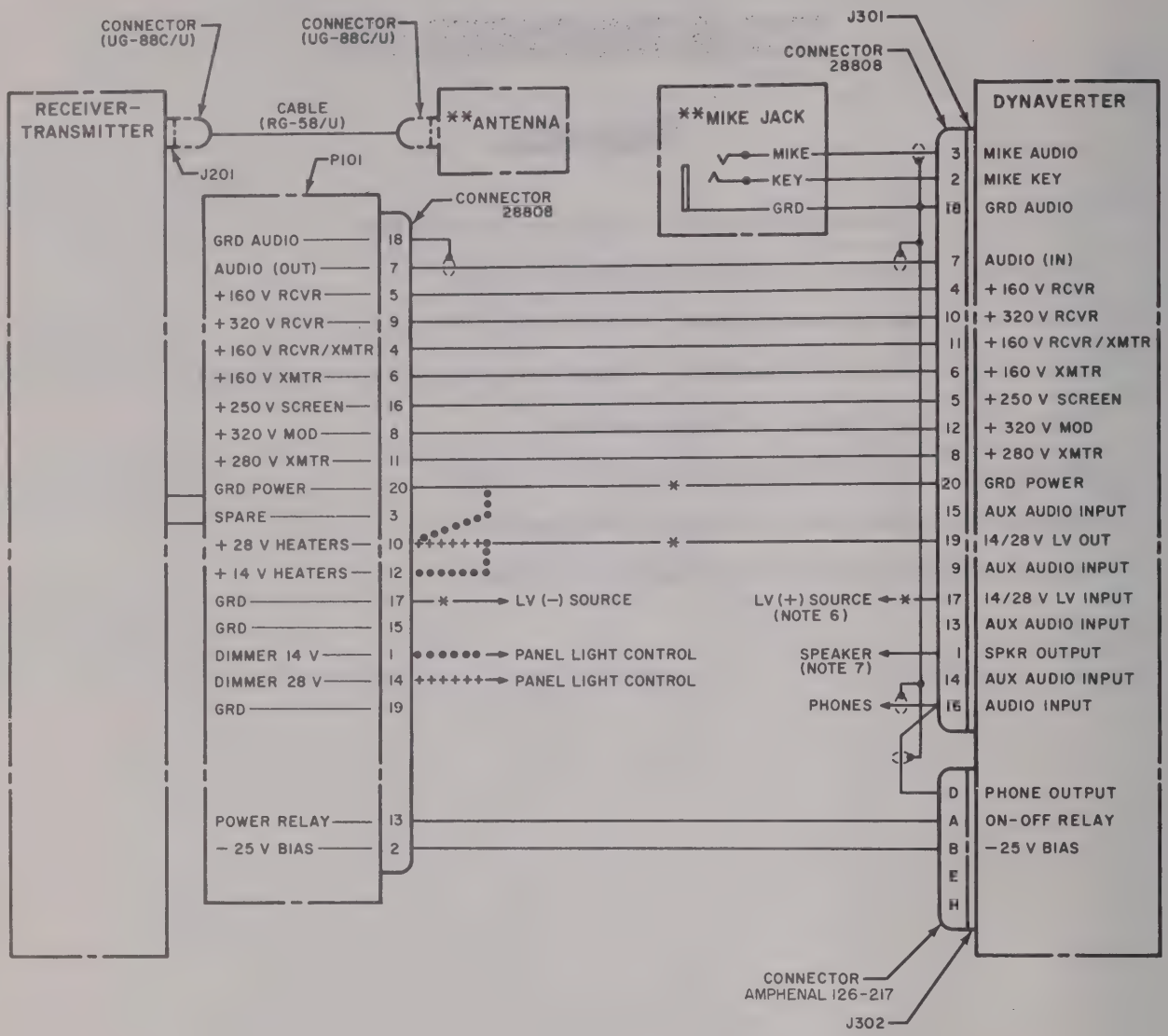
Figure 1-14. Receiver-Transmitter, Printed-circuit Assembly Wiring Diagram

Figure 1-15. Dynaverter, Schematic Diagram

Figure 1-16. Dynaverter, Main Assembly Wiring Diagram

Figure 1-17. Dynaverter, Modulator Wiring Diagram

Figure 1-18. Dynaverter, Power Supply Wiring Diagram



NOTES:

1. FOR SCHEMATIC DIAGRAM OF RECEIVER-TRANSMITTER, SEE FIGURE 1-12. FOR SCHEMATIC DIAGRAM OF DYNAVERTER, SEE FIGURE 1-15.
2. UNMARKED WIRES ARE NO. 20 AWG STRANDED COPPER, POLYVINYL CHLORIDE INSULATED. WIRES MARKED WITH ASTERISK (*) ARE NO. 14 AWG STRANDED COPPER, POLYVINYL CHLORIDE INSULATED. SHIELDED WIRES ARE NO. 20 AWG STRANDED COPPER WITH INSULATED SHIELD.
3. FOR 14-VOLT OPERATION, CONNECT WIRES MARKED .... AND OMIT WIRES MARKED ++++.
4. FOR 28-VOLT OPERATION, CONNECT WIRES MARKED ++++ AND OMIT WIRES MARKED ....
5. UNITS MARKED WITH A DOUBLE ASTERISK (**) ARE NOT SUPPLIED WITH THE CESSNA TRANSCEIVER 500.
6. CONNECT DYNAVERTER TO LV + SOURCE THROUGH A 15-AMPERE CIRCUIT BREAKER FOR 14-VOLT OPERATION OR THROUGH AN 8-AMPERE CIRCUIT BREAKER FOR 28-VOLT OPERATION.
7. IF SPEAKER IS NOT USED, TERMINATE TERMINAL 1 OF J301 WITH A 30-OHM, 2-WATT RESISTOR.
8. TO ENSURE PROPER GROUNDING OF EQUIPMENT, AIRCRAFT SURFACE TO WHICH MOUNTINGS OR UNITS ARE ATTACHED MUST BE CLEAN, BARE METAL.
9. REPLACEMENT INSERT FOR CONNECTOR 28808 IS AMPHENOL 126-807

Figure 1-11. Cessna Transceiver 500, Interconnection Diagram

NOTES:

1. FOR MAIN ASSEMBLY WI
FIGURE 1-13.

2. RESISTOR VALUES ARE I
K = 1000; M = 1,000,000.

3. CAPACITOR VALUES ARE
ADS ($\mu\mu$F), UNLESS OTHE

4. INDUCTOR VALUES ARE I
UNLESS OTHERWISE NOT

5. RELAY K101 IS SHOWN UN

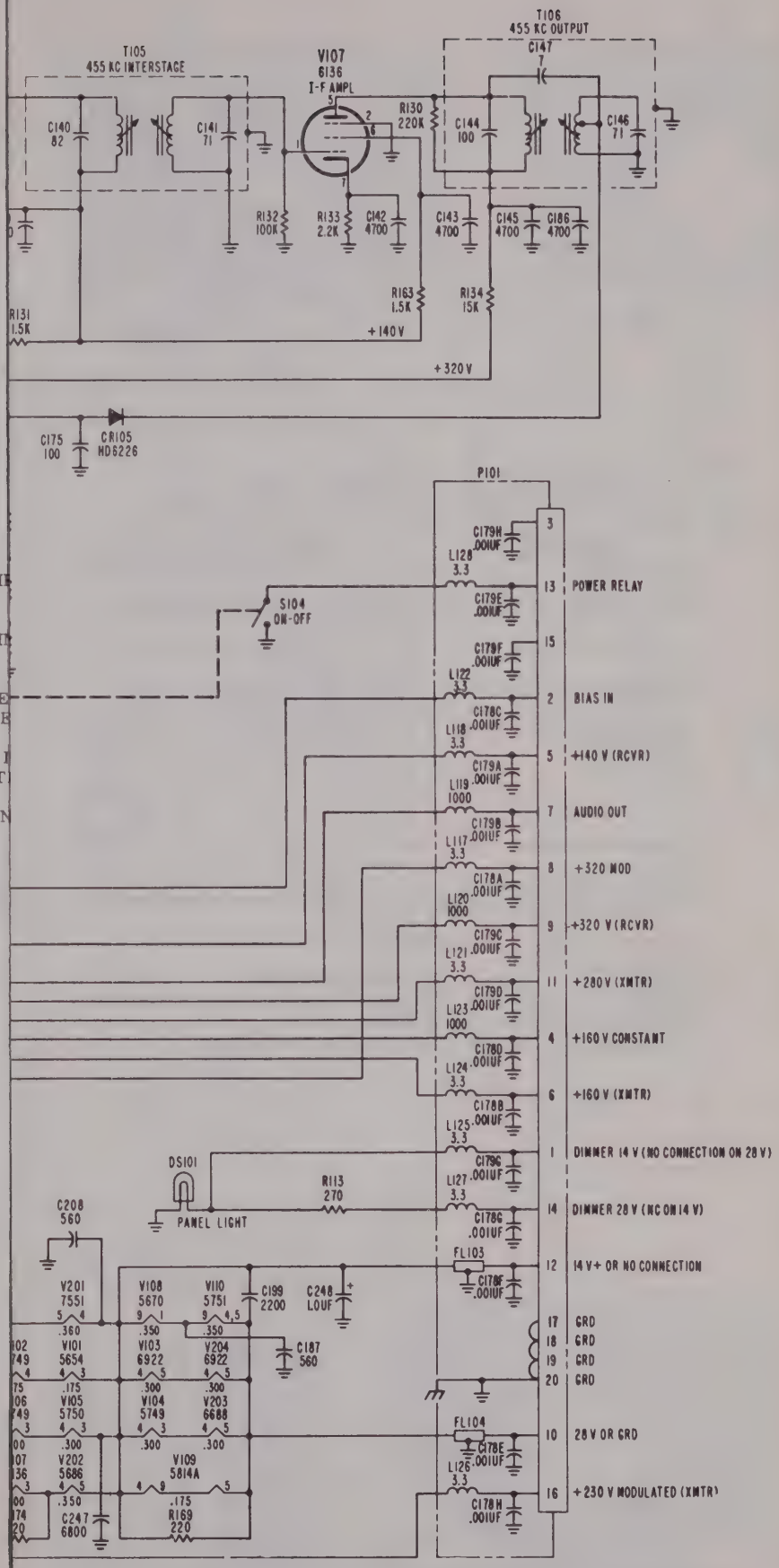
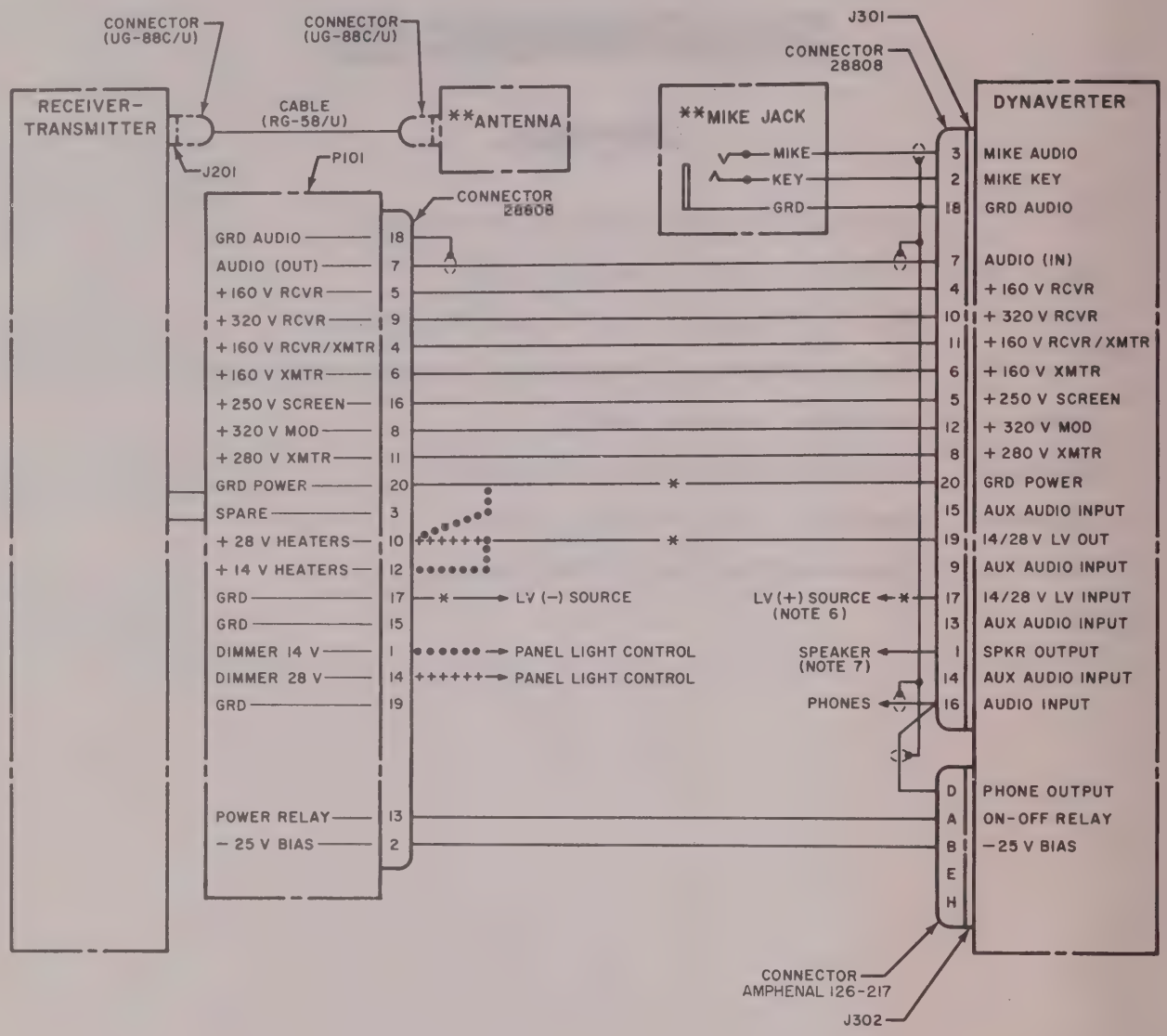


Figure 1-12. Receiver-Transmitter, Schematic Diagram



NOTES:

1. FOR SCHEMATIC DIAGRAM OF RECEIVER-TRANSMITTER, SEE FIGURE 1-12. FOR SCHEMATIC DIAGRAM OF DYNAVERTER, SEE FIGURE 1-15.
2. UNMARKED WIRES ARE NO. 20 AWG STRANDED COPPER, POLYVINYL CHLORIDE INSULATED. WIRES MARKED WITH ASTERISK (*) ARE NO. 14 AWG STRANDED COPPER, POLYVINYL CHLORIDE INSULATED. SHIELDED WIRES ARE NO. 20 AWG STRANDED COPPER WITH INSULATED SHIELD.
3. FOR 14-VOLT OPERATION, CONNECT WIRES MARKED .... AND OMIT WIRES MARKED ++++.
4. FOR 28-VOLT OPERATION, CONNECT WIRES MARKED ++++ AND OMIT WIRES MARKED ....
5. UNITS MARKED WITH A DOUBLE ASTERISK (**) ARE NOT SUPPLIED WITH THE CESSNA TRANSCEIVER 500.
6. CONNECT DYNAVERTER TO LV + SOURCE THROUGH A 15-AMPERE CIRCUIT BREAKER FOR 14-VOLT OPERATION OR THROUGH AN 8-AMPERE CIRCUIT BREAKER FOR 28-VOLT OPERATION.
7. IF SPEAKER IS NOT USED, TERMINATE TERMINAL 1 OF J301 WITH A 30-OHM, 2-WATT RESISTOR.
8. TO ENSURE PROPER GROUNDING OF EQUIPMENT, AIRCRAFT SURFACE TO WHICH MOUNTINGS OR UNITS ARE ATTACHED MUST BE CLEAN, BARE METAL.
9. REPLACEMENT INSERT FOR CONNECTOR 28808 IS AMPHENOL 126-807

Figure 1-11. Cessna Transceiver 500, Interconnection Diagram

NOTES:

1. FOR MAIN ASSEMBLY WIRING DIAGRAM, SEE FIGURE 1-13.
2. RESISTOR VALUES ARE IN OHMS. MULTIPLIERS: K = 1000; M = 1,000,000.
3. CAPACITOR VALUES ARE IN MICROMICROFARADS (μμF), UNLESS OTHERWISE NOTED.
4. INDUCTOR VALUES ARE IN MICROHENRIES (μH), UNLESS OTHERWISE NOTED.
5. RELAY K101 IS SHOWN UNENERGIZED.

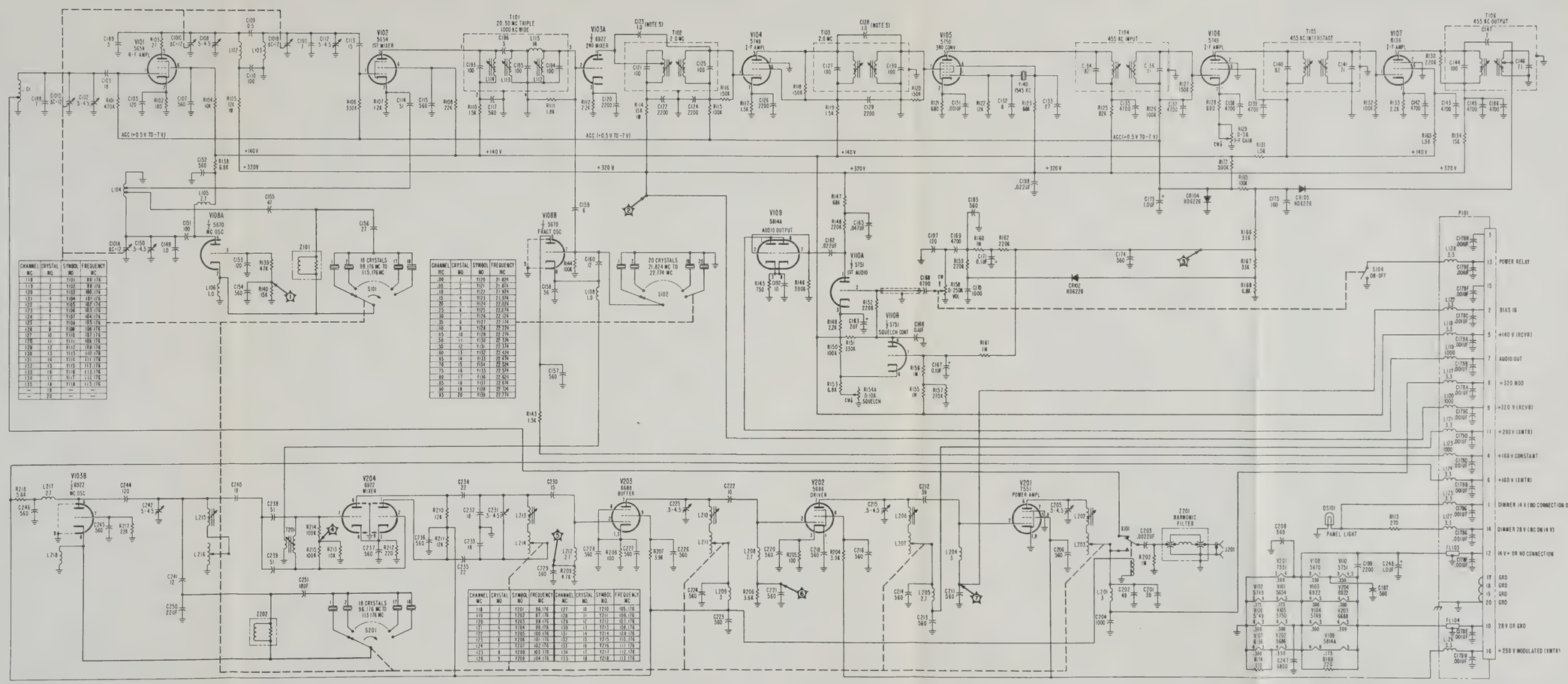
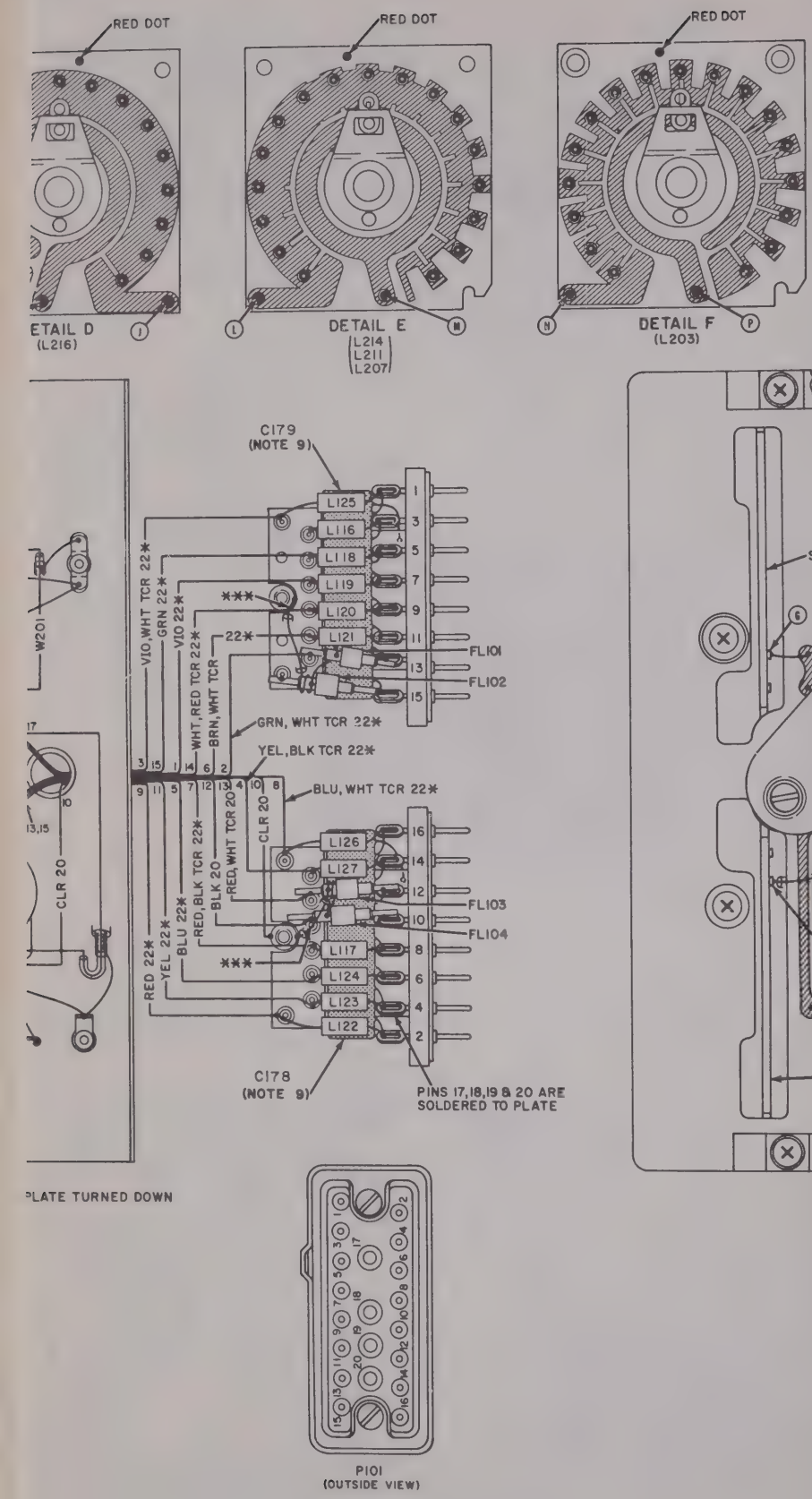


Figure 1-12. Receiver-Transmitter, Schematic Diagram


RED DOT
RED DOT
RED DOT
ETAIL D
(L216)
J
L
DETAIL E
(L214
L211
L207)
M
N
DETAIL F
(L203)
P
W201
CLR 20
PLATE TURNED DOWN
C179
(NOTE 9)
L125
L116
L118
L119
L120
L121
FL101
FL102
VIO, WHT TCR 22*
GRN 22*
VIO 22*
WHT, RED TCR 22*
BRN, WHT TCR
22*
***
GRN, WHT TCR 22*
YEL, BLK TCR 22*
BLU, WHT TCR 22*
CLR 20
L126
L127
FL103
FL104
L117
L124
L123
L122
RED, WHT TCR 20
BLK 20
RED, BLK TCR 22*
BLU 22*
YEL 22*
RED 22*
C178
(NOTE 9)
PINS 17,18,19 & 20 ARE
SOLDERED TO PLATE
S101
S102
S201
V204
CLR
BOTTOM VIEW
P101
(OUTSIDE VIEW)

NOTES:

1. FOR SC
URE 1-1

2. WIRES
ARE NO
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WITH C
ARE NO
TEFLO

3. TEFLO
SIZE IS
MARKE

4. SHADED
COPPE

5. UNETCH
CUIT, O
BOARD,

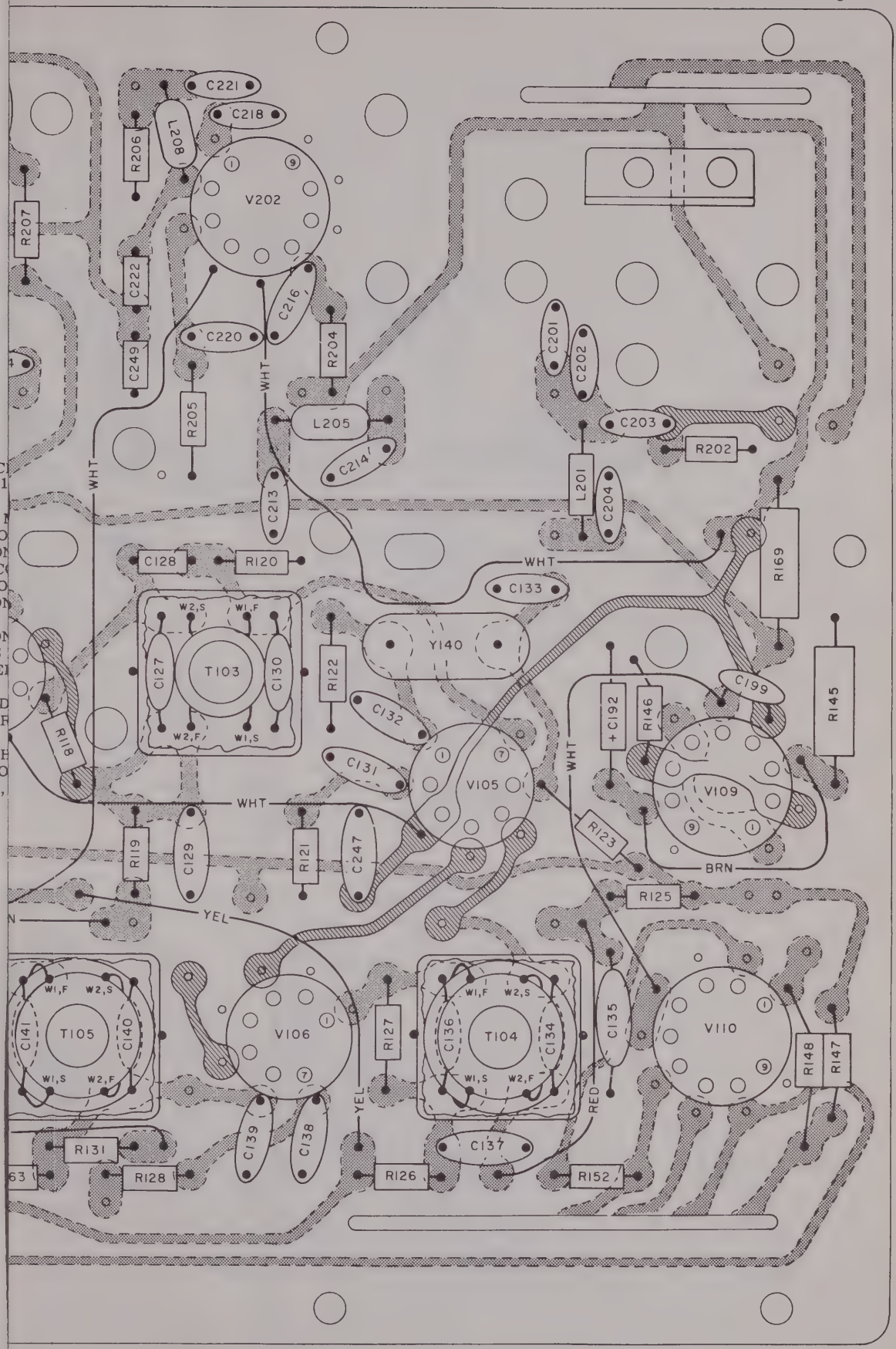


Figure 1-14. Receiver-Transmitter, Printed-circuit Assembly Wiring Diagram

NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 1-12.
2. FOR ASSOCIATED WIRING DIAGRAM, SEE FIGURE 1-14.
3. WIRES:

MARKING	DESCRIPTION
UNMARKED	NO. 22 AWG BARE, SOLID, TINNED COPPER
COLOR NOTE	NO. 24 AWG SOLID COPPER, TEFLON INSULATED
COLOR NOTE PLUS "22"	NO. 22 AWG SOLID COPPER, TEFLON INSULATED
COLOR NOTE PLUS "20"	NO. 20 AWG STRANDED COPPER, TEFLON INSULATED
COLOR NOTE, "22," PLUS ASTERISK (*)	NO. 22 AWG STRANDED COPPER, TEFLON INSULATED
ASTERISK (*)	NO. 24 AWG BARE, SOLID, TINNED COPPER
DOUBLE ASTERISK (**)	NO. 20 AWG BARE, SOLID, TINNED COPPER
TRIPLE ASTERISK (***)	NO. 28 AWG BARE, SOLID, TINNED COPPER
COLOR NOTE PLUS SHIELD (—⊖—)	NO. 22 AWG SOLID COPPER, COLORED TEFLON INSULATED, AND SHIELDED

4. TEFLON TUBING OF APPROPRIATE SIZE INSTALLED OVER WIRES MARKED —⊣—
5. SHADED AREA DENOTES UNETCHED COPPER.
6. UNETCHED COPPER GROUND CIRCUIT, ON COMPONENT SIDE OF BOARD, IS OMITTED FOR CLARITY.
7. CIRCLED LETTERS ARE REFERENCE DESIGNATIONS.

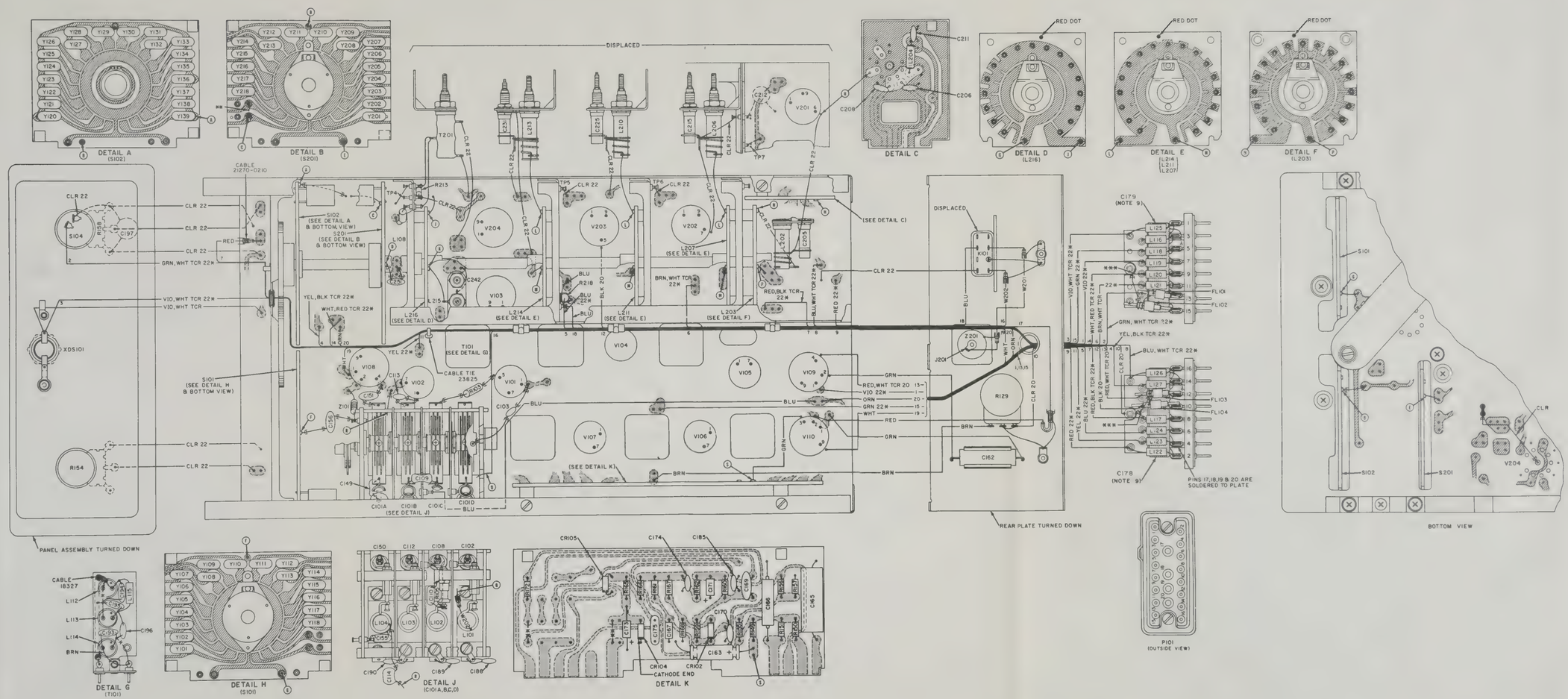


Figure 1-13. Receiver-Transmitter, Main Assembly Wiring Diagram

NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 1-12
2. WIRES MARKED WITH COLOR NOTE ARE NO. 24 AWG SOLID COPPER, TEFLON INSULATED. WIRES MARKED WITH COLOR NOTE AND ASTERISK (*) ARE NO. 22 AWG SOLID COPPER, TEFLON INSULATED.
3. TEFLON TUBING OF APPROPRIATE SIZE IS INSTALLED OVER WIRES MARKED —⊣⊢— .
4. SHADED AREA DENOTES UNETCHED COPPER.
5. UNETCHED COPPER GROUND CIRCUIT, ON COMPONENT SIDE OF BOARD, IS OMITTED FOR CLARITY.

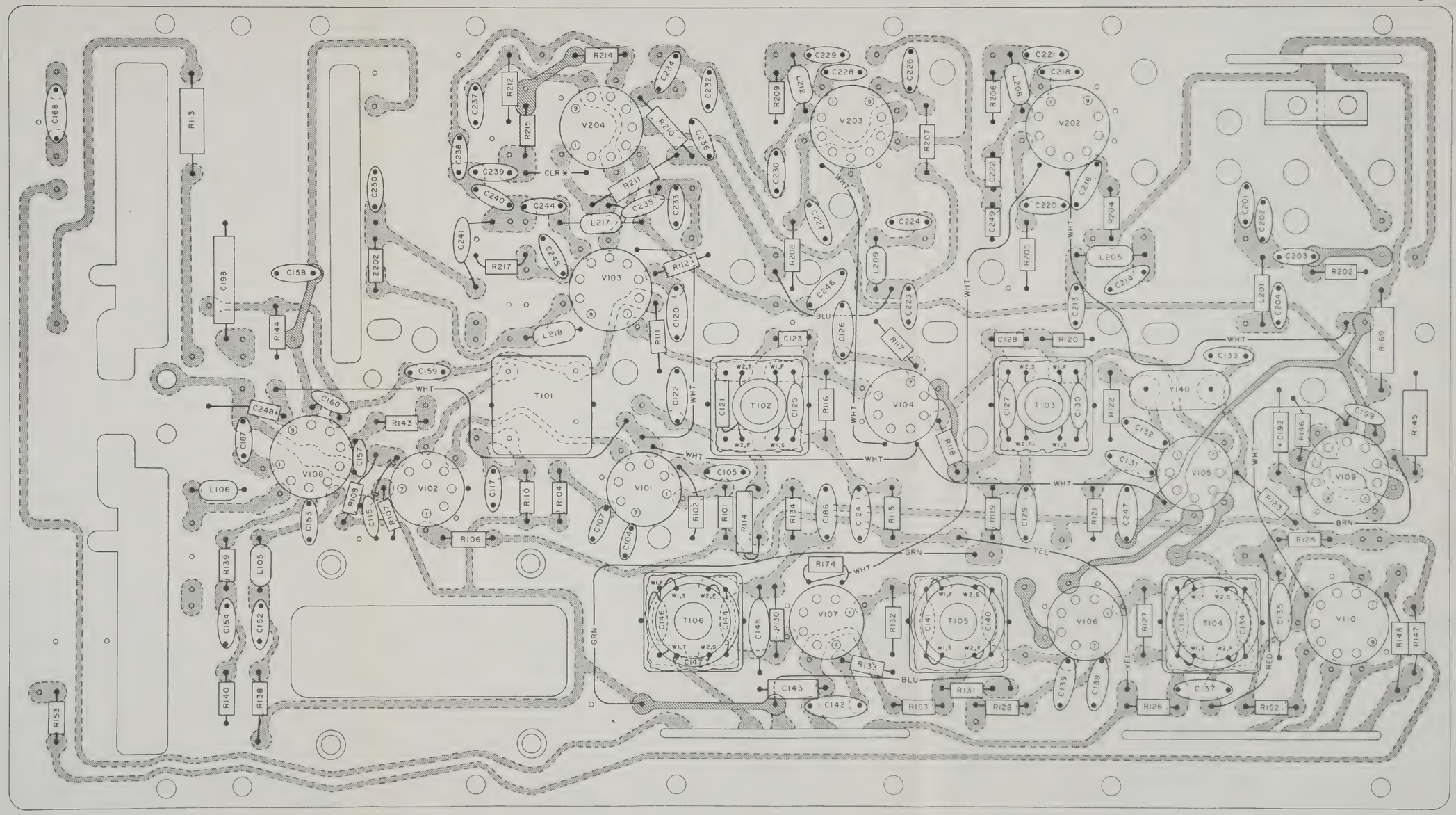
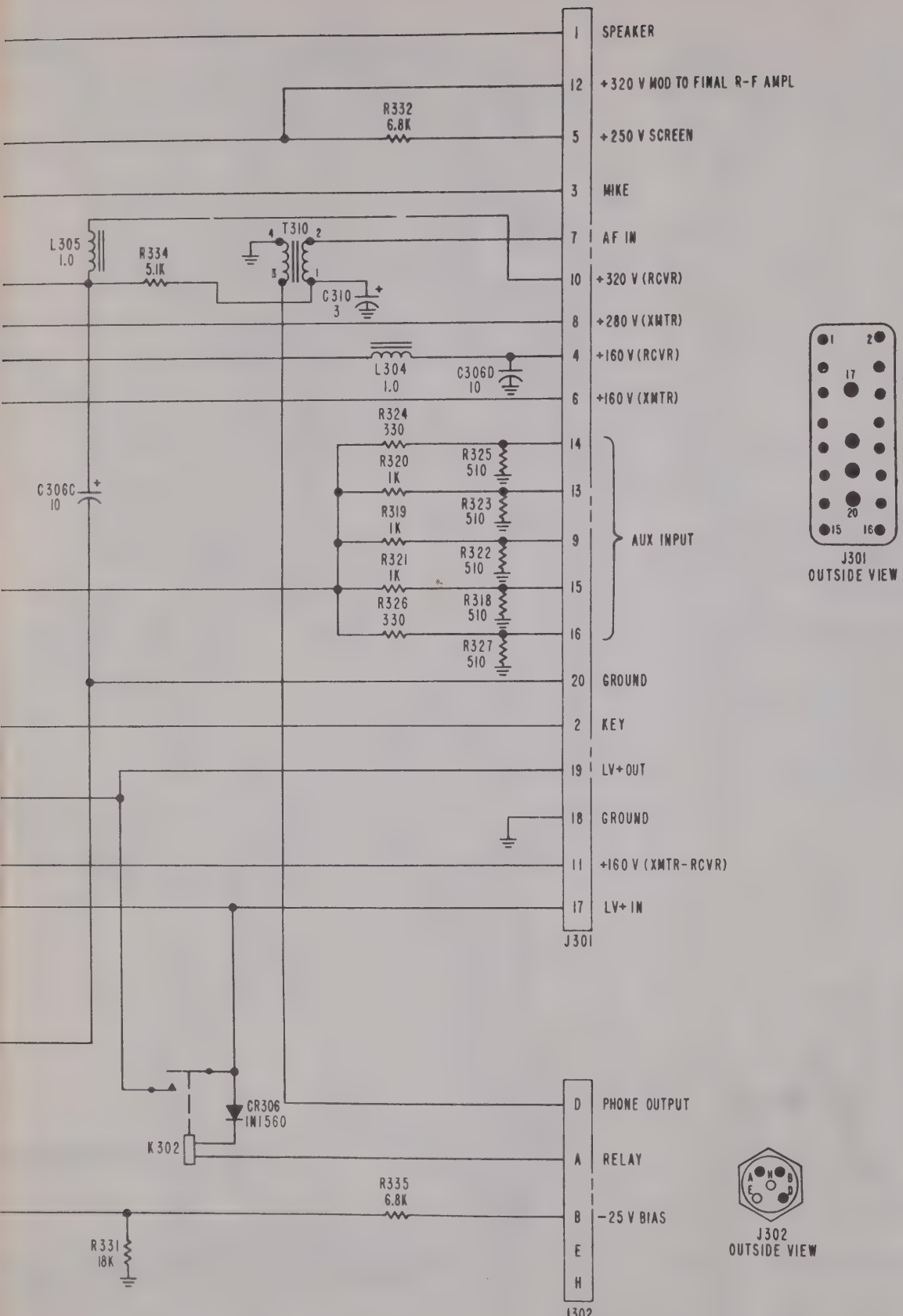


Figure 1-14. Receiver-Transmitter, Printed-circuit Assembly Wiring Diagram


1 SPEAKER
12 +320 V MOD TO FINAL R-F AMPL
5 +250 V SCREEN
3 MIKE
7 AF IN
10 +320 V (RCVR)
8 +280 V (XMTR)
4 +160 V (RCVR)
6 +160 V (XMTR)
14
13
9
15
16
AUX INPUT
20 GROUND
2 KEY
19 LV+ OUT
18 GROUND
11 +160 V (XMTR-RCVR)
17 LV+ IN
J301
R332 6.8K
L305 1.0
R334 5.1K
T310
C310 3
L304 1.0
C306D 10
C306C 10
R324 330
R320 1K
R319 1K
R321 1K
R326 330
R325 510
R323 510
R322 510
R318 510
R327 510
CR306 1N1560
K302
R335 6.8K
R331 18K
D PHONE OUTPUT
A RELAY
B -25 V BIAS
E
H
J302
J301 OUTSIDE VIEW
J302 OUTSIDE VIEW

NOTES:
1. FOR SCHE
2. FOR ASSO
3. WIRES MA
INSULATE
STRANDED
4. TEFLON T
5. SHADED A
6. R316 AND
7. IN 14-VOL
8. IN 28-VOL

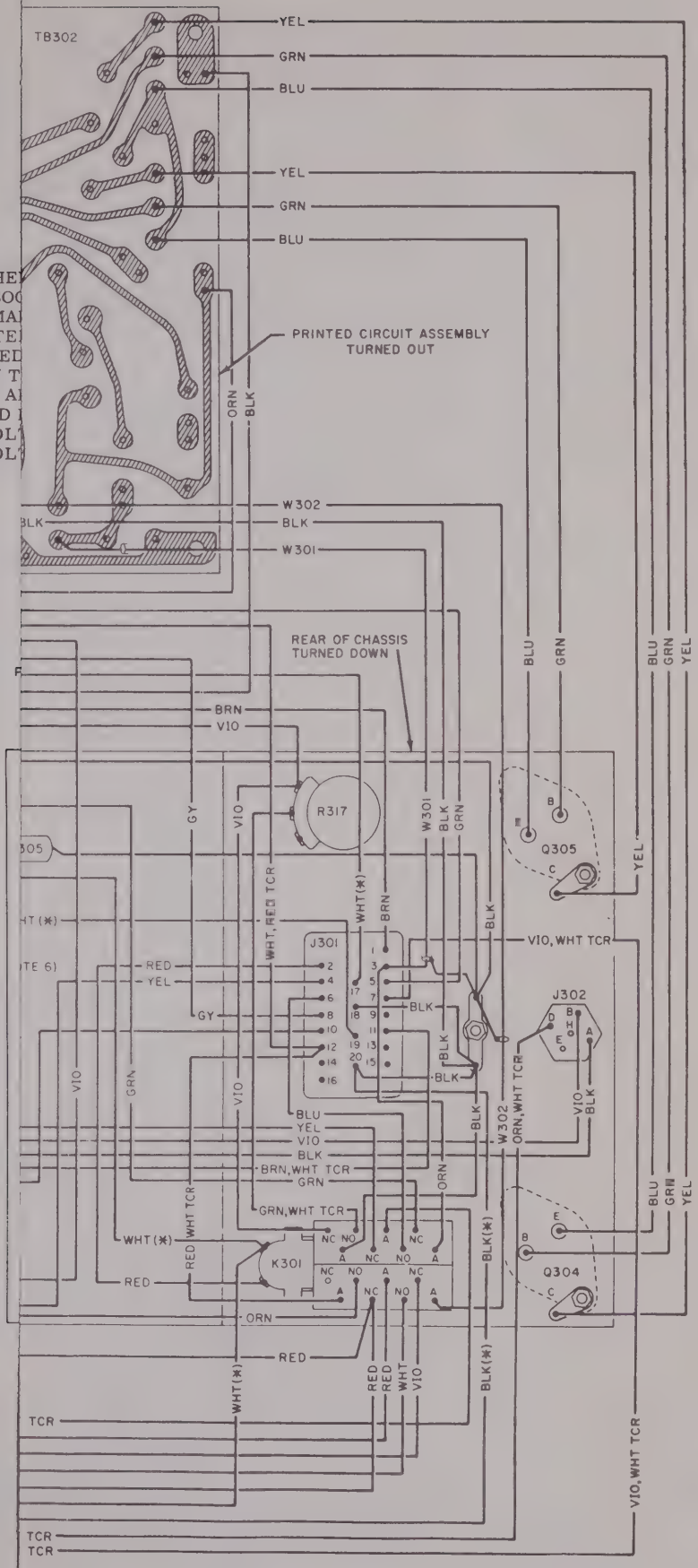


Figure 1-16. Dynaverter, Main Assembly Wiring Diagram

NOTES:

1. FOR MAIN ASSEMBLY WIRING DIAGRAM, SEE FIGURE 1-16
2. RESISTOR VALUES ARE IN OHMS. MULTIPLIERS: K = 1000; M = 1,000,000.
3. CAPACITOR VALUES ARE IN MICROFARADS (μF), UNLESS OTHERWISE NOTED.
4. INDUCTOR VALUES ARE IN MILLIHENRIES (MH), UNLESS OTHERWISE NOTED.
5. RELAYS K301 AND K302 ARE SHOWN UNENERGIZED.
6. R316 AND R328 ARE USED IN 28-VOLT UNITS ONLY.
7. VALUES AND TYPE NUMBERS IN PARENTHESES ARE FOR 28-VOLT UNITS ONLY.

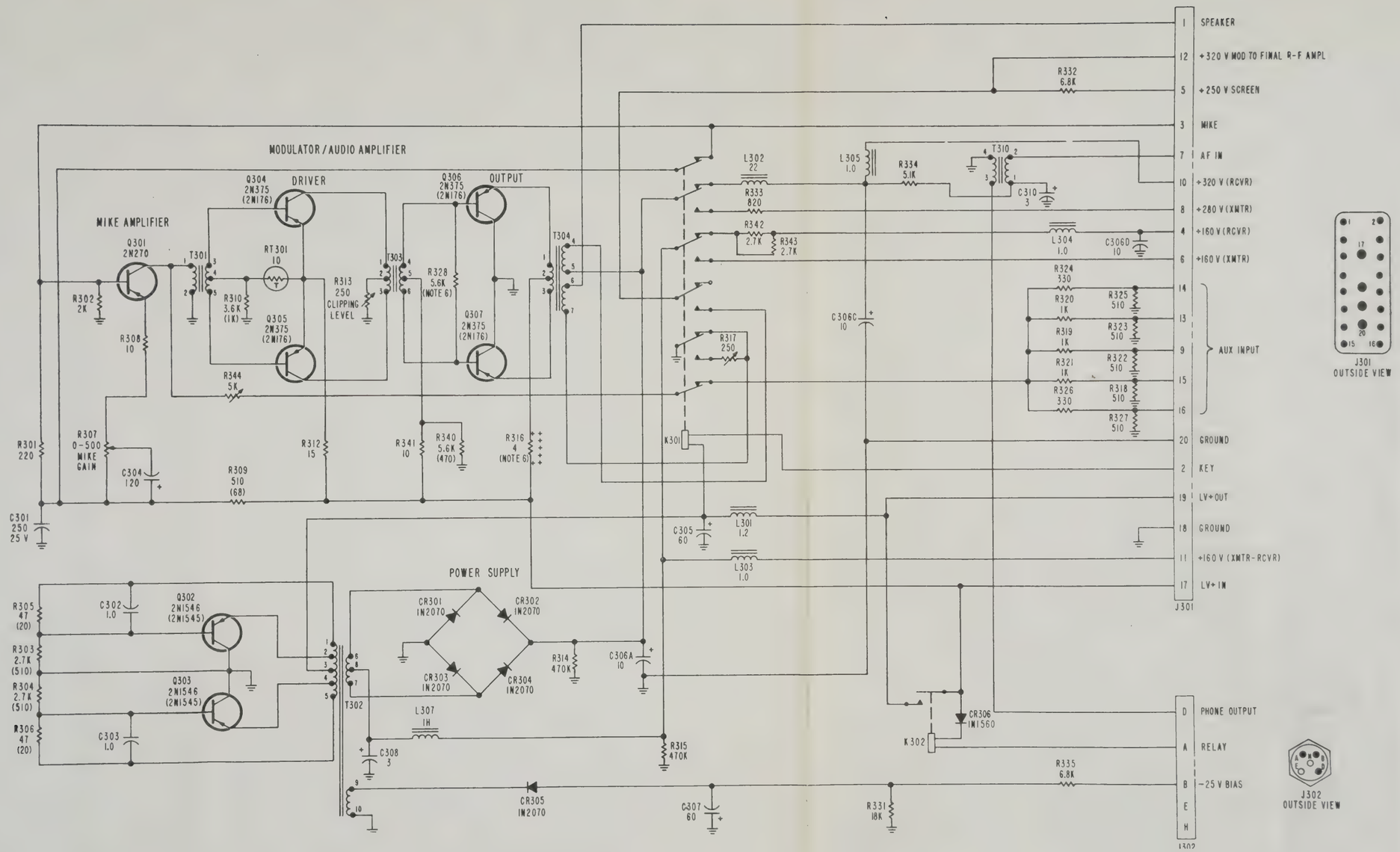


Figure 1-15. Dynaverter, Schematic Diagram

NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 1-15.
2. FOR ASSOCIATED WIRING DIAGRAMS, SEE FIGURES 1-17 AND 1-18.
3. WIRES MARKED WITH COLOR NOTE ARE NO. 22 AWG STRANDED COPPER, TEFLON INSULATED. WIRES MARKED WITH COLOR NOTE AND ASTERISK (*) ARE NO. 20 AWG STRANDED COPPER, TEFLON INSULATED.
4. TEFLON TUBING OF APPROPRIATE SIZE IS INSTALLED OVER WIRES MARKED —⊐—.
5. SHADED AREA DENOTES UNETCHED COPPER.
6. R316 AND R328 ARE USED IN 28-VOLT UNITS ONLY.
7. IN 14-VOLT UNITS, CONNECT WIRES MARKED •••• AND OMIT WIRES MARKED ++++.
8. IN 28-VOLT UNITS, CONNECT WIRES MARKED ++++ AND OMIT WIRES MARKED ••••.

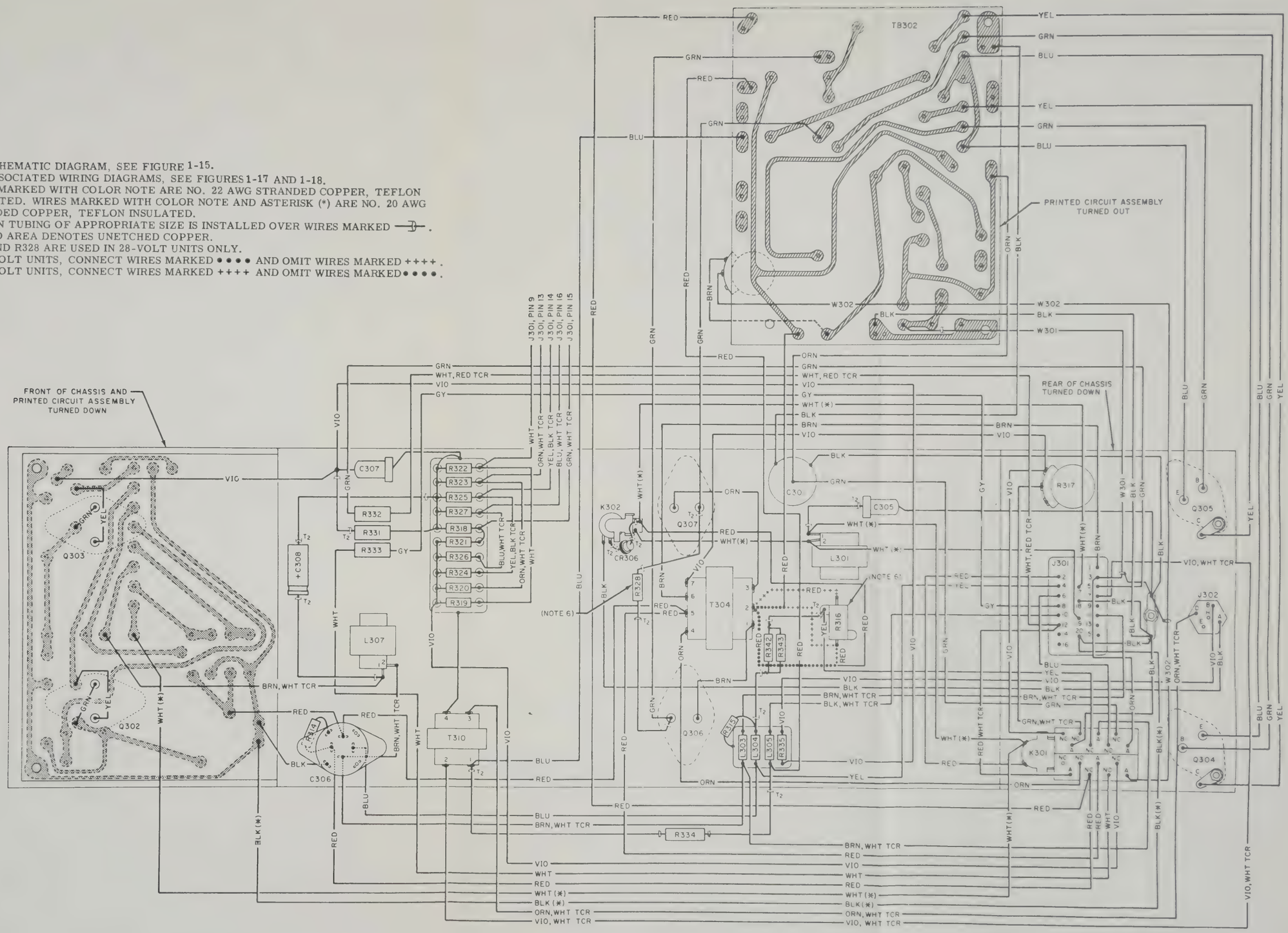


Figure 1-16. Dynaverter, Main Assembly Wiring Diagram

NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 1-15.
2. WIRES MARKED WITH COLOR NOTE ARE PART OF T301 AND T302. WIRES MARKED WITH COLOR NOTE AND ASTERISK (*) ARE NO. 24 AWG STRANDED COPPER, TEFLON INSULATED.
3. TEFLON TUBING OF APPROPRIATE SIZE IS INSTALLED OVER WIRES MARKED —⊣⊢— .
4. SHADED AREA DENOTES UNETCHED COPPER ON OPPOSITE SIDE OF BOARD.

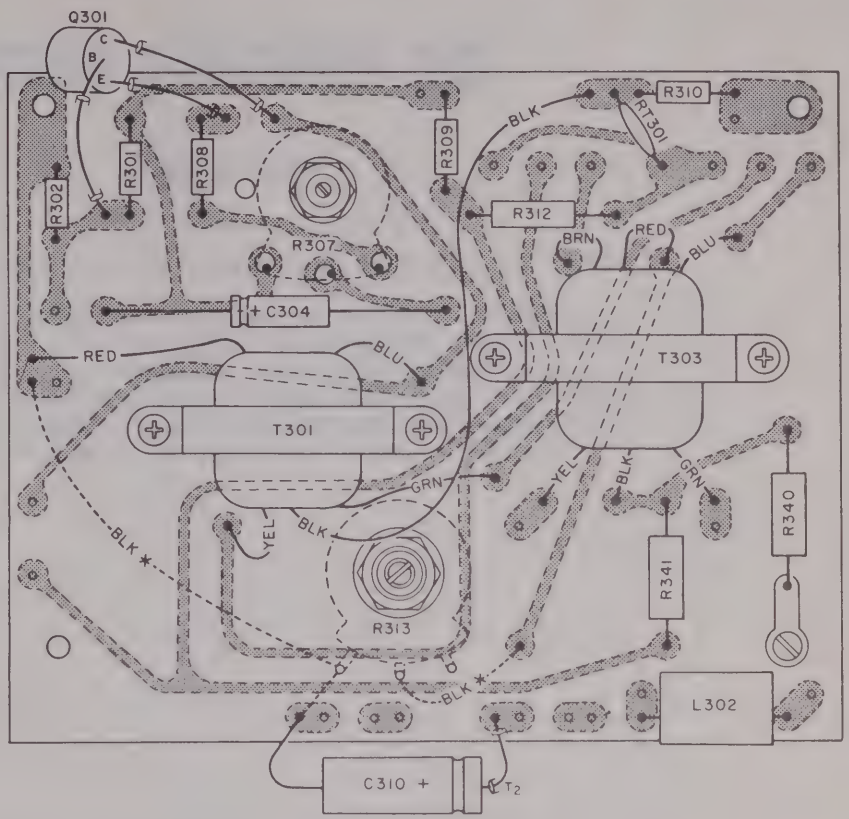


Figure 1-17. Dynaverter, Modulator, Wiring Diagram

NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 1-15.
2. SHADED AREA DENOTES UNETCHED COPPER ON OPPOSITE SIDE OF BOARD.

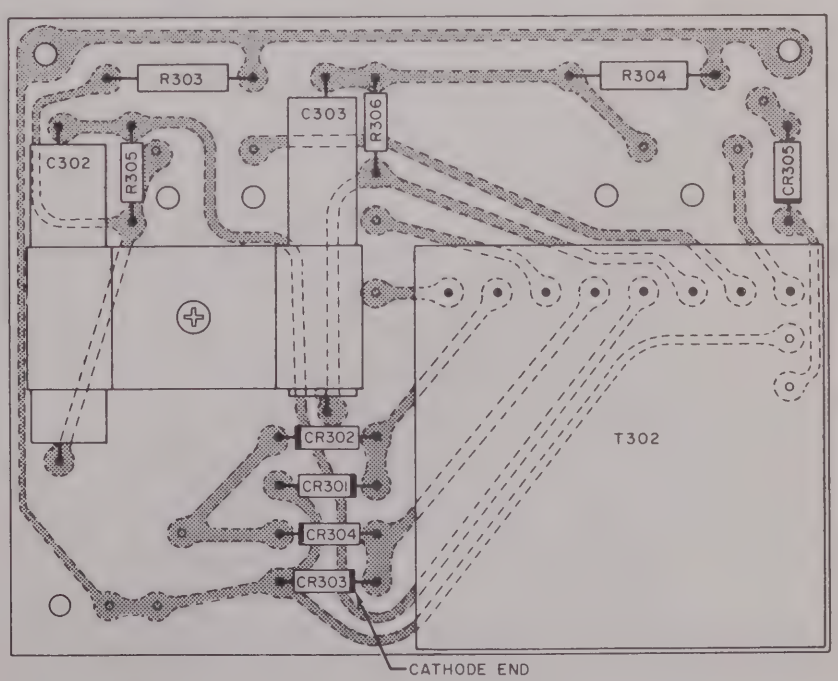


Figure 1-18. Dynaverter, Power Supply Wiring Diagram

CESSNA TRANSCEIVER 500

Parts List

This section lists and describes the detail parts of the Cessna Transceiver 500.

The listings are arranged in two groups: one covering mechanical units and the other covering electronic units. The listings for the mechanical units, arranged in order of disassembly, refer to accompanying exploded view illustrations by figure and index number for visual identification of the listed parts. The listings for the electronic units are arranged in an alphabetical-numerical sequence by the reference designations indicated on the schematic diagram for the unit.

Figure & Index No.	Part No.	Description 1 2 3 4 5 6	Units per Assy
		RECEIVER-TRANSMITTER	
1-19-	28410	RECEIVER-TRANSMITTER ASSEMBLY, Mechanical Parts	Ref
-1	26989	. KNOB	2
		(ATTACHING PARTS)	
-2	304-0008	. SETSCREW, Fluted socket dr, cup point, stl, cad pl, No. 4-40 thd by 1/8 in. lg	4
-3	13527	. WASHER, Spring tension	2
		- - - * - - -	
-4	28843	. KNOB ASSEMBLY	1
		(ATTACHING PARTS)	
-5	113-0008	. SCREW, Machine, bind h, brs, blk oxidized, No. 3-48 thd by 1/8 in. lg	1
-5A	1703	. WASHER, Lock, sst, 0.105 ID by 0.220 OD by 0.025 in. thk	1
-6	304-0012	. SETSCREW, Fluted socket dr, cup point, stl, cad pl, No. 4-40 thd by 3/16 in. lg	2
		- - - * - - -	
-6A	21623	. WASHER, Flat, sst, 0.257 ID by 0.344 OD by 0.0030 in. thk	1
-6B	7984	. WASHER, Spring tension	1
-7	27096	. DIAL	1
		(ATTACHING PARTS)	
-8	304-0012	. SETSCREW, Fluted socket dr, cup point, stl, cad pl, No. 4-40 thd by 3/16 in. lg	2
		- - - * - - -	
-9	28377	. PLATE ASSEMBLY, Front	1
		(ATTACHING PARTS)	
-10	113-0010	. SCREW, Machine, bind h, brs, blk oxidized, No. 3-48 thd by 5/32 in. lg	4
		- - - * - - -	
-11	29329	. PANEL ASSEMBLY	1
		(ATTACHING PARTS)	
-12	Comm	. SCREW, Assembled washer, bind h, brs screw, ni pl, sst lockwasher, No. 3-48 thd by 5/16 in. lg	4
-13	303-0006	. SETSCREW, Fluted socket dr, cup point, stl, cad pl, No. 3-48 thd by 3/32 in. lg	3
-14	303-0012	. SETSCREW, Fluted socket dr, cup point, stl, cad pl, No. 3-48 thd by 3/16 in. lg	4
		- - - * - - -	
-15	28374	. . GEAR, Spur	2
		(ATTACHING PARTS)	
-16	303-0012	. . SETSCREW, Fluted socket dr, cup point, stl, cad pl, No. 3-48 thd by 3/16 in. lg	4
		- - - * - - -	
-17	28376	. . GEAR, Spur	1
		(ATTACHING PARTS)	
-18	303-0012	. . SETSCREW, Fluted socket dr, cup point, stl, cad pl, No. 3-48 thd by 3/16 in. lg	2
		- - - * - - -	
-19	330/R	. . LAMP, Incandescent, 14 v, 0.080 amp, T-1-3/4 bulb, midget flange base, red coated	1
-20	632) –	. . COLLAR	1
-21	4032-000)	. . LAMPHOLDER	1
		(ATTACHING PARTS)	
-22	—	. . NUT	1
-23	—	. . WASHER, Lock	1
-24	—	. . WASHER, Flat	1
		- - - * - - -	
-25	28578	. . PANEL SUBASSEMBLY	1
		(ATTACHING PARTS)	
-26	Comm	. . SCREW, Assembled washer, bind h, brs screw, ni pl, sst lockwasher, No. 3-48 thd by 3/16 in. lg	8
		- - - * - - -	

Figure & Index No.	Part No.	Description 1 2 3 4 5 6	Units per Assy
		RECEIVER-TRANSMITTER - Continued	
1-19-27	type FB-16	. . RESISTOR, Variable, comp, 250,000 ohms ±30 per cent	1
		(ATTACHING PARTS)	
-28	—	. . NUT, Hexagon, 1/4-32 NEF-2B thd, 3/8 across flats by 3/32 in. thk	1
-29	—	. . WASHER, Lock, 1/4 ID by 15/32 OD by 0.025 in. thk	1
		- - - * - - -	
-30	type F	. . RESISTOR, Variable, comp, 10,000 ohms ±30 per cent, 0.3 w	1
		(ATTACHING PARTS)	
-31	—	. . NUT, Hexagon, 1/4-32 NEF-2B thd by 3/8 across flats by 3/32 in. thk	1
-32	—	. . WASHER, Lock, 0.250 ID by 15/32 OD by 0.025 in. thk	1
		- - - * - - -	
-33	28368	. . SHAFT	1
		(ATTACHING PARTS)	
-34	5100-37-MD	. . RING, Retaining	2
		- - - * - - -	
-35	29794	. . SPRING, Helical, extension	2
-36	27676	. . STRAP ASSEMBLY	2
		(ATTACHING PARTS)	
-37	5100-12-C	. . RING, Retaining	2
-38	6376	. . WASHER, Flat, sst, 0.130 ID by 0.219 OD by 0.0062 in. thk	2
		- - - * - - -	
-39	27678	. . CAM	2
		(ATTACHING PARTS)	
-40	303-0008	. . SETSCREW, Fluted socket dr, cup point, stl, cad pl, No. 3-48 thd by 1/8 in. lg	4
		- - - * - - -	
-41	28755	. . SHAFT	1
-42	28369	. . SHAFT	1
-43	28577	. . PANEL SUBASSEMBLY	1
-44	26835	. GEAR, Spur	1
-45	27677	. SPRING, Helical, extension	1
-46	27676	. STRAP ASSEMBLY	1
		(ATTACHING PARTS)	
-47	5100-12-C	. RING, Retaining	1
-48	6376	. WASHER, Flat, sst, 0.130 ID by 0.219 OD by 0.0062 in. thk	1
		- - - * - - -	
-49	27678	. CAM	1
		(ATTACHING PARTS)	
-50	303-0008	. SETSCREW, Fluted socket dr, cup point, stl, cad pl, No. 3-48 thd by 1/8 in. lg	2
		- - - * - - -	
-51	28374	. GEAR, Spur	1
		(ATTACHING PARTS)	
-52	303-0012	. SETSCREW, Fluted socket dr, cup point, stl, cad pl, No. 3-48 thd by 3/16 in. lg	2
		- - - * - - -	
-53	28367	. SHAFT	1
-54	28757	. SHAFT	1
		(ATTACHING PARTS)	
-55	303-0012	. SETSCREW, Fluted socket dr, cup point, stl, cad pl, No. 3-48 thd by 3/16 in. lg	2
		- - - * - - -	

Figure & Index No.	Part No.	Description 1 2 3 4 5 6	Units per Assy
		RECEIVER-TRANSMITTER - Continued	
1-19-56	29284	. PRINTED CIRCUIT ASSEMBLY	1
		(ATTACHING PARTS)	
-57	Comm	. SCREW, Assembled washer, bind h, brs screw, ni pl, sst lockwasher, No. 4-40 thd by 1/4 in. lg	1
-58	624-4020	. SCREW, Machine, pan hd, sst, Phillips dr, No. 4-40 thd by 5/16 in. lg	1
-59	104-0024	. SCREW, Machine, bind h, brs, ni pl, No. 4-40 thd by 3/8 in. lg	1
-60	14680	. WASHER, Spring tension	1
		- - - * - - -	
-61	26279	. . CONTACT	1
-62	28982	. . GEAR, Spur	1
		(ATTACHING PARTS)	
-63	5100-50-MD	. . RING, Retaining	1
-64	29017	. . WASHER, Flat, sst, 0.516 ID by 0.687 OD by 0.005 in. thk	3
		- - - * - - -	
-65	26206-*	. . CRYSTAL, Quartz (to complete part number replace asterisk with frequency in MC)	20
-66	26990	. . PRINTED CIRCUIT SUBASSEMBLY	1
-67	28836	. PRINTED CIRCUIT ASSEMBLY	1
		(ATTACHING PARTS)	
-68	Comm	. SCREW, Assembled washer, bind h, brs screw, ni pl, sst lockwasher, No. 4-40 thd by 1/4 in. lg	1
-69	624-4020	. SCREW, Machine, pan hd, sst, Phillips dr, No. 4-40 thd by 5/16 in. lg	1
-70	14680	. WASHER, Spring tension	1
-71	104-0020	. SCREW, Machine, bind h, brs, ni pl, No. 4-40 thd by 5/16 in. lg	1
		- - - * - - -	
-72	26279	. . CONTACT	1
-73	26844	. . HUB ASSEMBLY	1
		(ATTACHING PARTS)	
-74	5100-37-MF	. . RING, Retaining	1
-75	2670	. . WASHER, Flat, phosphor bronze, ni pl, 0.380 ID by 0.562 OD by 0.010 in. thk	1
		- - - * - - -	
-76	26207-*	. . CRYSTAL, Quartz (to complete part number replace asterisk with frequency in MC)	18
-77	28605	. . PRINTED CIRCUIT BOARD SUBASSEMBLY	1
-78	27765	. PRINTED CIRCUIT ASSEMBLY	1
		(ATTACHING PARTS)	
-79	Comm	. SCREW, Assembled washer, bind h, brs screw, ni pl, sst lockwasher, No. 4-40 thd by 1/4 in. lg	1
-80	624-4020	. SCREW, Machine, pan h, sst, Phillips dr, No. 4-40 thd by 5/16 in. lg	2
-81	14680	. WASHER, Spring tension	2
		- - - * - - -	
-82	26279	. . CONTACT	1
-83	26844	. . HUB ASSEMBLY	1
		(ATTACHING PARTS)	
-84	5100-37-MF	. . RING, Retaining	1
-85	2670	. . WASHER, Flat, phosphor bronze, ni pl, 0.380 ID by 0.562 OD by 0.010 in. thk	1
		- - - * - - -	
-86	26207-*	. . CRYSTAL, Quartz (to complete part number replace asterisk with frequency in MC)	18
-87	26991	. . PRINTED CIRCUIT BOARD SUBASSEMBLY	1
-88	26980	. SLEEVE	1
		(ATTACHING PART)	
-89	303-0006	. SETSCREW, Fluted socket dr, cup point, stl, cad pl, No. 3-48 thd by 3/32 in. lg	1
		- - - * - - -	

Figure & Index No.	Part No.	Description 1 2 3 4 5 6	Units per Assy
		RECEIVER-TRANSMITTER - Continued	
1-19-90	14699	. TERMINAL ASSEMBLY	1
		(ATTACHING PARTS)	
-91	Comm	. SCREW, Assembled washer, bind h, brs screw, ni pl, sst lockwasher, No. 3-48 thd by 1/4 in. lg	1
-92	1703	. WASHER, Lock, sst, 0.105 ID by 0.220 OD by 0.025 in. thk	1
		- - - * - - -	
-92A	3S2791GC310AW-14	. RELAY, Armature, 3 amp at 28 vdc, 2 amp at 115 vac, 300 mw	1
		(ATTACHING PARTS)	
-92B	Comm	. SCREW, Assembled washer, bind h, brs screw, ni pl, sst lockwasher, No. 4-40 thd by 5/16 in. lg	4
-92C	6009	. NUT, Hexagon, brs, ni pl, No. 4-40 thd by 0.078 in. thk	4
		- - - * - - -	
-93	28756	. SHAFT	1
		(ATTACHING PARTS)	
-94	303-0006	. SETSCREW, Fluted socket dr, cup point, stl, cad pl, No. 3-48 thd by 3/32 in. lg	10
		- - - * - - -	
-95	28489	. PRINTED CIRCUIT ASSEMBLY	1
		(ATTACHING PARTS)	
-96	103-0048	. SCREW, Machine, bind h, brs, ni pl, No. 3-48 thd by 3/4 in. lg	2
-97	4561	. NUT, Hexagon, brs, ni pl, No. 3-48 thd by 0.062 in. thk	2
-98	10353	. WASHER, Spring tension	2
		- - - * - - -	
-99	26283	. CONTACT	10
-99A	28937	. SLEEVE	1
-100	27737	. PRINTED CIRCUIT ASSEMBLY	3
		(ATTACHING PARTS)	
-101	103-0016	. SCREW, Machine, bind h, brs, ni pl, No. 3-48 thd by 1/4 in. lg	4
-102	10353	. WASHER, Spring tension	4
		- - - * - - -	
-103	27733	. PRINTED CIRCUIT ASSEMBLY	1
		(ATTACHING PARTS)	
-104	103-0016	. SCREW, Machine, bind h, brs, ni pl, No. 3-48 thd by 1/4 in. lg	2
-105	10353	. WASHER, Spring tension	2
		- - - * - - -	
-106	28945	. CAPACITOR ASSEMBLY, Gang	1
		(ATTACHING PARTS)	
-107	4058	. SCREW, Machine, bind h, brs, ni pl, No. 3-48 thd by 3/16 in. lg	2
-108	104-0020	. SCREW, Machine, bind h, brs, ni pl, No. 4-40 thd by 5/16 in. lg	3
-109	14680	. WASHER, Spring tension	4
-110	104-0024	. SCREW, Machine, bind h, brs, ni pl, No. 4-40 thd by 3/8 in. lg	1
		- - - * - - -	
-111	28715	. SHIELD, Printed circuit	1
-112	28821	. SHIELD, Printed circuit	1
-113	28825	. SHIELD	1
		(ATTACHING PARTS)	
-114	Comm	. SCREW, Assembled washer, bind h, brs screw, ni pl, sst lockwasher, No. 3-48 thd by 1/8 in. lg	2
		- - - * - - -	
-115	26683	. GEAR ASSEMBLY	1
		(ATTACHING PARTS)	
-116	303-0006	. SETSCREW, Fluted socket dr, cup point, stl, cad pl, No. 3-48 thd by 3/32 in. lg	2
		- - - * - - -	

Reference Designation	Description	Part No.
	RECEIVER-TRANSMITTER	
C101	CAPACITOR ASSEMBLY	28945
C102	CAPACITOR, Variable, ceramic, 0.5 to 4.5 μμf, 500 vdcw	PCST-6
C103	CAPACITOR, Fixed, ceramic, 18 μμf ±5 per cent, 500 vdcw	27697-0180
C104	CAPACITOR, Fixed, ceramic, 560 μμf ±10 per cent, 500 vdcw	EW561
C105	CAPACITOR, Fixed, ceramic, 120 μμf ±5 per cent, 500 vdcw	27698-0121
C106	NOT USED	
C107	CAPACITOR, Fixed, ceramic, 560 μμf ±10 per cent, 500 vdcw	ERC EW561
C108	CAPACITOR, Variable, same as C102	
C109	CAPACITOR, Fixed, ceramic, 0.5 μμf ±0.25 μμf, 500 vdcw	8791-9502
C110	CAPACITOR, Fixed, mica, 100 μμf ±5 per cent, 500 vdcw	VTDM-15-101J
C111	NOT USED	
C112	CAPACITOR, Variable, same as C102	
C113	CAPACITOR, Fixed, ceramic, 15 μμf ±5 per cent, 500 vdcw	27697-0150
C114	CAPACITOR, Fixed, mica, 51 μμf ±5 per cent, 500 vdcw	VTDM-15-510J
C115	CAPACITOR, Fixed, same as C107	
C116	NOT USED	
C117	CAPACITOR, Fixed, same as C107	
C118	NOT USED	
C119	NOT USED	
C120	CAPACITOR, Fixed, ceramic, 2200 μμf ±20 per cent, 500 vdcw	EW222
C121	CAPACITOR, Fixed, ceramic, 100 μμf ±5 per cent, 75 vdcw at +125 Deg C, 200 vdcw at +85 Deg C	28651-0101
C122	CAPACITOR, Fixed, same as C120	
C123	CAPACITOR, Fixed, ceramic, 1 μμf ±5 per cent, 500 vdcw	type GA
C124	CAPACITOR, Fixed, same as C120	
C125	CAPACITOR, Fixed, same as C121	
C126	CAPACITOR, Fixed, same as C120	
C127	CAPACITOR, Fixed, same as C121	
C128	CAPACITOR, Fixed, same as C123	
C129	CAPACITOR, Fixed, same as C120	
C130	CAPACITOR, Fixed, same as C121	
C131	CAPACITOR, Fixed, ceramic, 1000 μμf ±10 per cent, 500 vdcw	EW102
C132	CAPACITOR, Fixed, ceramic, 8 μμf ±5 per cent, 500 vdcw	27697-9801
C133	CAPACITOR, Fixed, ceramic, 27 μμf ±5 per cent, 500 vdcw	27697-0270
C134	CAPACITOR, Fixed, ceramic, 82 μμf ±5 per cent, 75 vdcw at +125 Deg C, 200 vdcw at +85 Deg C	28651-0820
C135	CAPACITOR, Fixed, ceramic, 4700 μμf ±20 per cent, 500 vdcw	EW472
C136	CAPACITOR, Fixed, ceramic, 71 μμf ±5 per cent, 75 vdcw at +125 Deg C, 200 vdcw at +85 Deg C	28651-0710
C137	CAPACITOR, Fixed, same as C135	
C138	CAPACITOR, Fixed, same as C135	
C139	CAPACITOR, Fixed, same as C135	
C140	CAPACITOR, Fixed, same as C134	

Reference Designation	Description	Part No.
	RECEIVER-TRANSMITTER - Continued	
C141	CAPACITOR, Fixed, same as C136	
C142	CAPACITOR, Fixed, same as C135	
C143	CAPACITOR, Fixed, same as C135	
C144	CAPACITOR, Fixed, same as C121	
C145	CAPACITOR, Fixed, same as C135	
C146	CAPACITOR, Fixed, same as C136	
C147	CAPACITOR, Fixed, ceramic, 7 μμf ±5 per cent, 500 vdcw	27696-9701
C148	NOT USED	
C149	CAPACITOR, Fixed, ceramic, 1 μμf ±5 per cent, 500 vdcw	8795-9101
C150	CAPACITOR, Variable, glass, 0.7 to 4.0 μμf, 500 vdcw	680076
C151	CAPACITOR, Fixed, ceramic, 100 μμf ±5 per cent, 500 vdcw	27698-0101
C152	CAPACITOR, Fixed, same as C107	
C153	CAPACITOR, Fixed, ceramic, 120 μμf ±5 per cent, 500 vdcw	27698-0121
C154	CAPACITOR, Fixed, same as C107	
C155	CAPACITOR, Fixed, mica, 47 μμf ±5 per cent, 500 vdcw	VTDM-15-470J
C156	CAPACITOR, Fixed, same as C133	
C157	CAPACITOR, Fixed, same as C107	
C158	CAPACITOR, Fixed, ceramic, 56 μμf ±5 per cent, 500 vdcw	27697-0560
C159	CAPACITOR, Fixed, ceramic, 6 μμf ±5 per cent, 500 vdcw	27697-9601
C160	CAPACITOR, Fixed, ceramic, 12 μμf ±5 per cent, 500 vdcw	27697-0120
C161	NOT USED	
C162	CAPACITOR, Fixed, paper, 0.022 μf ±20 per cent, 400 vdcw	118P22304S4
C163	CAPACITOR, Fixed, electrolytic, 2 μf ±20 per cent, 150 vdcw	110D205X0150G1
C164	NOT USED	
C165	CAPACITOR, Fixed, paper, 0.047 μf ±20 per cent, 400 vdcw	196P47304S4
C166	CAPACITOR, Fixed, plastic, 0.01 μf ±20 per cent, 300 vdcw	TWA3S1-10
C167	CAPACITOR, Fixed, electrolytic, 0.1 μf ±20 per cent, 35 vdcw	150D104X0035A2
C168	CAPACITOR, Fixed, same as C135	
C169	CAPACITOR, Fixed, ceramic, 4700 μμf ±10 per cent, 100 vdcw	GP4-472
C170	CAPACITOR, Fixed, ceramic, 1000 μμf ±20 per cent, 500 vdcw	EW102
C171	CAPACITOR, Fixed, same as C167	
C172	NOT USED	
C173	CAPACITOR, Fixed, electrolytic, 1 μf ±20 per cent, 35 vdcw	150D105X0035A2
C174	CAPACITOR, Fixed, ceramic, 560 μμf ±20 per cent, 500 vdcw	EW561
C175	CAPACITOR, Fixed, same as C110	
C176	NOT USED	
C177	NOT USED	
C178	CAPACITOR, Fixed, ceramic, 2 sections, 0.001 μf ±20 per cent, 1000 vdcw each section	type BDS
C179	CAPACITOR, Fixed, same as C178	
C180	CAPACITOR, Fixed, same as C178	
C181	CAPACITOR, Fixed, same as C178	
C182	CAPACITOR, Fixed, same as C178	

Reference Designation	Description	Part No.
	RECEIVER-TRANSMITTER - Continued	
C183	CAPACITOR, Fixed, same as C178	
C184	CAPACITOR, Fixed, same as C178	
C185	CAPACITOR, Fixed, same as C107	
C186	CAPACITOR, Fixed, same as C135	
C187	CAPACITOR, Fixed, same as C107	
C188	CAPACITOR, Fixed, ceramic, 7 μμf ±5 per cent, 500 vdcw	27697-9701
C189	CAPACITOR, Fixed, ceramic, 5 μμf ±5 per cent, 500 vdcw	27697-9501
C190	CAPACITOR, Fixed, same as C188	
C191	CAPACITOR, Fixed, same as C178	
C192	CAPACITOR, Fixed, electrolytic, 10 μf ±20 per cent, 20 vdcw	150D106X0020B2
C193	CAPACITOR, Fixed, same as C121	
C194	CAPACITOR, Fixed, same as C121	
C195	CAPACITOR, Fixed, same as C121	
C196	CAPACITOR, Fixed, ceramic, 5 μμf ±5 per cent, 500 vdcw	27696-9501
C197	CAPACITOR, Fixed, same as C153	
C198	CAPACITOR, Fixed, paper, 0.022 μf ±20 per cent, 400 vdcw	118P22304S4
C199	CAPACITOR, Fixed, ceramic, 2200 μμf ±20 per cent, 500 vdcw	EW222
C200	NOT USED	
C201	CAPACITOR, Fixed, ceramic, 39 μμf ±5 per cent, 500 vdcw	27697-0390
C202	CAPACITOR, Fixed, ceramic, 47 μμf ±5 per cent, 500 vdcw	27697-0470
C203	CAPACITOR, Fixed, ceramic, 2200 μμf ±20 per cent, 500 vdcw	EW222
C204	CAPACITOR, Fixed, ceramic, 1000 μμf ±10 per cent, 500 vdcw	EW102
C205	CAPACITOR, Variable, ceramic, 0.5 to 4.5 μμf, 500 vdcw	PCST-6
C206	CAPACITOR, Fixed, ceramic, 560 μμf ±10 per cent, 500 vdcw	EW561
C207	NOT USED	
C208	CAPACITOR, Fixed, same as C206	
C209	NOT USED	
C210	NOT USED	
C211	CAPACITOR, Fixed, same as C206	
C212	CAPACITOR, Fixed, ceramic, 39 μμf ±5 per cent, 500 vdcw	27697-0390
C213	CAPACITOR, Fixed, same as C206	
C214	CAPACITOR, Fixed, same as C204	
C215	CAPACITOR, Variable, same as C205	
C216	CAPACITOR, Fixed, same as C206	
C217	NOT USED	
C218	CAPACITOR, Fixed, same as C206	
C219	NOT USED	
C220	CAPACITOR, Fixed, same as C206	
C221	CAPACITOR, Fixed, same as C206	
C222	CAPACITOR, Fixed, ceramic, 10 μμf ±5 per cent, 500 vdcw	8795-0100
C223	CAPACITOR, Fixed, same as C206	
C224	CAPACITOR, Fixed, same as C206	
C225	CAPACITOR, Variable, same as C205	
C226	CAPACITOR, Fixed, same as C206	
C227	CAPACITOR, Fixed, same as C206	
C228	CAPACITOR, Fixed, same as C206	

Reference Designation	Description	Part No.
	RECEIVER-TRANSMITTER - Continued	
C229	CAPACITOR, Fixed, same as C206	
C230	CAPACITOR, Fixed, ceramic, 15 μμf ±5 per cent, 500 vdcw	8795-0150
C231	CAPACITOR, Variable, same as C205	
C232	CAPACITOR, Fixed, ceramic, 18 μμf ±5 per cent, 500 vdcw	27697-0180
C233	CAPACITOR, Fixed, same as C232	
C234	CAPACITOR, Fixed, ceramic, 22 μμf ±5 per cent, 500 vdcw	27697-0220
C235	CAPACITOR, Fixed, same as C234	
C236	CAPACITOR, Fixed, same as C206	
C237	CAPACITOR, Fixed, same as C206	
C238	CAPACITOR, Fixed, ceramic, 51 μμf ±5 per cent, 500 vdcw	28608-0510
C239	CAPACITOR, Fixed, same as C238	
C240	CAPACITOR, Fixed, same as C232	
C241	CAPACITOR, Fixed, ceramic, 12 μμf ±5 per cent, 500 vdcw	28608-0200
C242	CAPACITOR, Variable, glass, 0.7 to 4.0 μμf, 500 vdcw	680076
C243	NOT USED	
C244	CAPACITOR, Fixed, ceramic, 120 μμf ±5 per cent, 500 vdcw	27698-0121
C245	CAPACITOR, Fixed, ceramic, 560 μμf ±5 per cent, 500 vdcw	27698-0561
C246	CAPACITOR, Fixed, same as C206	
C247	CAPACITOR, Fixed, ceramic, 6800 μμf ±20 per cent, 500 vdcw	EW682
C248	CAPACITOR, Fixed, electrolytic, 1 μf ±20 per cent, 35 vdcw	150D105X0035A2
C249	CAPACITOR, Fixed, ceramic, 2 μμf ±0.25 μμf, 500 vdcw	8795-9201
C250	CAPACITOR, Fixed, same as C234	
C251	CAPACITOR, Fixed, ceramic, 18 μμf ±5 per cent, 500 vdcw	27696-0180
CR101	NOT USED	
CR102	SEMICONDUCTOR DEVICE, Diode	HD6226
CR103	NOT USED	
CR104	SEMICONDUCTOR DEVICE, Diode, same as CR102	
CR105	SEMICONDUCTOR DEVICE, Diode, same as CR102	
DS101	LAMP, Incandescent, midget flange base, T-1-3/4 bulb, red coated, 14 v, 0.08 amp	330/R
FL101	FILTER, Low pass	SMFO-2
FL102	NOT USED	
FL103	FILTER, Low pass, same as FL101	
FL104	FILTER, Low pass, same as FL101	
J201	CONNECTOR, Receptacle, electrical, type UG291/U	13787
K101	RELAY, Armature, 3 amp at 28 vdc, 2 amp at 115 vac	3S2791GC310AW-14
L101	COIL	28909
L102	COIL	28918
L103	COIL, Same as L102	
L104	COIL	30058

Reference Designation	Description	Part No.
	RECEIVER-TRANSMITTER - Continued	
L105	COIL, RF, 2.7 μh ±10 per cent	10100-636
L106	COIL, RF, 0.15 μh ±20 per cent	10100-620
L107	COIL, RF, 0.25 μh ±10 per cent	10100-615
L108	COIL, RF, 1 μh ±20 per cent	10100-630
L109	NOT USED	
L110	NOT USED	
L111	NOT USED	
L112	COIL	28655
L113	COIL, Same as L112	
L114	COIL, Same as L112	
L115	COIL, RF, 14 μh ±10 per cent	CF-Ir-7/16
L116	NOT USED	
L117	COIL, RF, 3.3 μh ±10 per cent	type 1537-24
L118	COIL, RF, same as L117	
L119	COIL, RF, same as L117	
L120	COIL, RF, same as L117	
L121	COIL, RF, same as L117	
L122	COIL, RF, same as L117	
L123	COIL, RF, same as L117	
L124	COIL, RF, same as L117	
L125	COIL, RF, same as L117	
L126	COIL, RF, same as L117	
L127	COIL, RF, same as L117	
L201	COIL, RF, 3 μh ±10 per cent	10100-652
L202	COIL ASSEMBLY	27745
L203	PRINTED CIRCUIT ASSEMBLY	28489
L204	COIL, RF, same as L201	
L205	COIL, RF, 2.7 μh ±10 per cent	10100-636
L206	COIL ASSEMBLY	27746
L207	PRINTED CIRCUIT ASSEMBLY	27737
L208	COIL, RF, same as L205	
L209	COIL, RF, same as L201	
L210	COIL ASSEMBLY	27747
L211	PRINTED CIRCUIT ASSEMBLY, Same as L207	
L212	COIL, RF, same as L205	
L213	COIL ASSEMBLY	27746
L214	PRINTED CIRCUIT ASSEMBLY, Same as L207	
L215	COIL ASSEMBLY	27749
L216	PRINTED CIRCUIT ASSEMBLY	27733
L217	COIL, RF, same as L205	
L218	COIL, RF	30339
P101	CONNECTOR ASSEMBLY, Consists of 30100, 25994-0003, and 28907	
R101	RESISTOR, Fixed, comp, 470,000 ohms ±10 per cent, 1/4 w	CB4741
R102	RESISTOR, Fixed, comp, 180 ohms ±10 per cent, 1/4 w	CB1811
R103	RESISTOR, Fixed, comp, 27 ohms ±5 per cent, 1/2 w	EB2705
R104	RESISTOR, Fixed, comp, 10,000 ohms ±10 per cent, 1/4 w	CB1031
R105	RESISTOR, Fixed, comp, 12,000 ohms ±5 per cent, 1 w	GB1235
R106	RESISTOR, Fixed, comp, 330,000 ohms ±10 per cent, 1/4 w	CB3341
R107	RESISTOR, Fixed, comp, 1200 ohms ±10 per cent, 1/4 w	CB1221
R108	RESISTOR, Fixed, comp, 22,000 ohms ±10 per cent, 1/4 w	CB2231

Reference Designation	Description	Part No.
	RECEIVER-TRANSMITTER - Continued	
R109	NOT USED	
R110	RESISTOR, Fixed, comp, 1500 ohms ±10 per cent, 1/4 w	CB1521
R111	RESISTOR, Fixed, comp, 1800 ohms ±10 per cent, 1/4 w	CB1821
R112	RESISTOR, Fixed, comp, 2200 ohms ±10 per cent, 1/4 w	CB2221
R113	RESISTOR, Fixed, comp, 270 ohms ±5 per cent, 1 w	GB2715
R114	RESISTOR, Fixed, comp, 15,000 ohms ±5 per cent, 1 w	GB1535
R115	RESISTOR, Fixed, comp, 100,000 ohms ±10 per cent, 1/4 w	CB1041
R116	RESISTOR, Fixed, comp, 150,000 ohms ±10 per cent, 1/4 w	CB1541
R117	RESISTOR, Fixed, same as R110	
R118	RESISTOR, Fixed, same as R116	
R119	RESISTOR, Fixed, same as R110	
R120	RESISTOR, Fixed, same as R116	
R121	RESISTOR, Fixed, comp, 680 ohms ±10 per cent, 1/4 w	CB8811
R122	RESISTOR, Fixed, comp, 12,000 ohms ±10 per cent, 1/4 w	CB1231
R123	RESISTOR, Fixed, comp, 68,000 ohms ±5 per cent, 1/2 w	EB6835
R124	NOT USED	
R125	RESISTOR, Fixed, comp, 82,000 ohms ±5 per cent, 1/2 w	EB8235
R126	RESISTOR, Fixed, same as R115	
R127	RESISTOR, Fixed, same as R116	
R128	RESISTOR, Fixed, same as R121	
R129	RESISTOR, Variable, comp, 5000 ohms ±30 per cent, 0.3 w	type 70
R130	RESISTOR, Fixed, comp, 220,000 ohms ±10 per cent, 1/4 w	CB2241
R131	RESISTOR, Fixed, same as R110	
R132	RESISTOR, Fixed, same as R115	
R133	RESISTOR, Fixed, comp, 2200 ohms ±10 per cent, 1/4 w	CB2221
R134	RESISTOR, Fixed, comp, 15,000 ohms ±5 per cent, 1/2 w	EB1535
R135	NOT USED	
R136	NOT USED	
R137	NOT USED	
R138	RESISTOR, Fixed, comp, 6800 ohms ±5 per cent, 1/2 w	EB6825
R139	RESISTOR, Fixed, comp, 4700 ohms ±10 per cent, 1/4 w	CB4721
R140	RESISTOR, Fixed, comp, 1000 ohms ±10 per cent, 1/4 w	CB1021
R141	RESISTOR, Fixed, comp, 470 ohms ±10 per cent, 1/4 w	CB4711
R142	RESISTOR, Fixed, same as R141	
R143	RESISTOR, Fixed, same as R110	
R144	RESISTOR, Fixed, same as R115	
R145	RESISTOR, Fixed, comp, 750 ohms ±5 per cent, 1 w	GB7515
R146	RESISTOR, Fixed, comp, 390,000 ohms ±10 per cent, 1/4 w	CB3941

Reference Designation	Description	Part No.
	RECEIVER-TRANSMITTER - Continued	
R147	RESISTOR, Fixed, comp, 68,000 ohms ±10 per cent, 1/4 w	CB6831
R148	RESISTOR, Fixed, comp, 220,000 ohms ±10 per cent, 1/4 w	CB2241
R149	RESISTOR, Fixed, same as R117	
R150	RESISTOR, Fixed, same as R115	
R151	RESISTOR, Fixed, same as R106	
R152	RESISTOR, Fixed, same as R148	
R153	RESISTOR, Fixed, comp, 6800 ohms ±10 per cent, 1/4 w	CB6821
R154	RESISTOR, Variable, comp, 10,000 ohms ±30 per cent, 0.3 w	type F
R155	RESISTOR, Fixed, comp, 1 megohm ±10 per cent, 1/4 w	CB1051
R156	RESISTOR, Fixed, same as R155	
R157	RESISTOR, Fixed, comp (value between 150,000 ohms and 390,000 ohms selected at time of final adjustment)	341-*[1]
R158	RESISTOR, Variable, comp, 250,000 ohms ±30 per cent, 0.1 w	type TD-70
R159	RESISTOR, Fixed, same as R130	
R160	RESISTOR, Fixed, same as R155	
R161	RESISTOR, Fixed, same as R155	
R162	RESISTOR, Fixed, same as R130	
R163	RESISTOR, Fixed, same as R110	
R164	NOT USED	
R165	RESISTOR, Fixed, same as R115	
R166	RESISTOR, Fixed, comp, 33,000 ohms ±10 per cent, 1/4 w	CB3331
R167	RESISTOR, Fixed, same as R166	
R168	RESISTOR, Fixed, same as R153	
R169	RESISTOR, Fixed, comp, 220 ohms ±5 per cent, 1 w	GB2215
R170	NOT USED	
R171	NOT USED	
R172	RESISTOR, Fixed, comp, 560,000 ohms ±5 per cent, 1/4 w	CB5645
R173	NOT USED	
R174	RESISTOR, Fixed, comp, 120 ohms ±5 per cent, 1/2 w	EB1215
R201	NOT USED	
R202	RESISTOR, Fixed, comp, 1 megohm ±10 per cent, 1/4 w	CB1051
R203	NOT USED	
R204	RESISTOR, Fixed, comp, 3900 ohms ±5 per cent, 1/2 w	EB3925
R205	RESISTOR, Fixed, comp, 100 ohms ±5 per cent, 1/2 w	EB1015
R206	RESISTOR, Fixed, comp, 3600 ohms ±5 per cent, 1/2 w	EB3625
R207	RESISTOR, Fixed, same as R204	
R208	RESISTOR, Fixed, same as R205	
R209	RESISTOR, Fixed, comp, 4700 ohms ±5 per cent, 1/2 w	EB4725
R210	RESISTOR, Fixed, comp, 12,000 ohms ±5 per cent, 1/2 w	EB1235
R211	RESISTOR, Fixed, same as R210	
R212	RESISTOR, Fixed, comp, 220 ohms ±5 per cent, 1/2 w	EB2215

[1]To complete part number, replace asterisk with resistance value in ohms.

Reference Designation	Description	Part No.
	RECEIVER-TRANSMITTER - Continued	
R213	RESISTOR, Fixed, comp, 10,000 ohms ±10 per cent, 1/4 w	CB1031
R214	RESISTOR, Fixed, comp, 100,000 ohms ±10 per cent, 1/4 w	CB1041
R215	RESISTOR, Fixed, same as R214	
R216	NOT USED	
R217	RESISTOR, Fixed, comp, 22,000 ohms ±10 per cent, 1/4 w	CB2231
R218	RESISTOR, Fixed, comp, 5600 ohms ±5 per cent, 1 w	GB5625
S101	SWITCH, Printed circuit assembly	28836
S102	SWITCH, Printed circuit assembly	29284
S103	NOT USED	
S104	SWITCH, Rotary, DPST, 1 amp at 20 v, 1/4 amp at 67-1/2 v, 0.1 w (supplied with R158 resistor)	type TD-70
S201	SWITCH, Printed circuit assembly	27765
T101	FILTER ASSEMBLY	28713
T102	COIL, Universal wound	28859
T103	COIL, Universal wound	26404
T104	COIL, Universal wound	28867
T105	COIL, Same as T104	
T106	COIL, Universal wound	28866
T201	COIL ASSEMBLY	27748
V101	ELECTRON TUBE, Type 5654	700-0118
V102	ELECTRON TUBE, Same as V101	
V103	ELECTRON TUBE, Type 6922	700-0225
V104	ELECTRON TUBE, Type 5749	700-0197
V105	ELECTRON TUBE, Type 5750	700-0198
V106	ELECTRON TUBE, Same as V104	
V107	ELECTRON TUBE, Type 6136	700-0141
V108	ELECTRON TUBE, Type 5670	700-0120
V109	ELECTRON TUBE, Type 5814A	700-0128
V110	ELECTRON TUBE, Type 5751	700-0125
V201	ELECTRON TUBE, Type 7551	700-0228
V202	ELECTRON TUBE, Type 5686	700-0121
V203	ELECTRON TUBE, Type 6688	700-0224
V204	ELECTRON TUBE, Type 6922	700-0225
XDS101	LAMPHOLDER	4032-000-632
Y101	CRYSTAL UNIT, Quartz, 98.176 MC	26207-9817
Y102	CRYSTAL UNIT, Quartz, 99.176 MC	26207-9917
Y103	CRYSTAL UNIT, Quartz, 100.176 MC	26207-1001
Y104	CRYSTAL UNIT, Quartz, 101.176 MC	26207-1011
Y105	CRYSTAL UNIT, Quartz, 102.176 MC	26207-1021
Y106	CRYSTAL UNIT, Quartz, 103.176 MC	26207-1031
Y107	CRYSTAL UNIT, Quartz, 104.176 MC	26207-1041
Y108	CRYSTAL UNIT, Quartz, 105.176 MC	26207-1051
Y109	CRYSTAL UNIT, Quartz, 106.176 MC	26207-1061
Y110	CRYSTAL UNIT, Quartz, 107.176 MC	26207-1071
Y111	CRYSTAL UNIT, Quartz, 108.176 MC	26207-1081
Y112	CRYSTAL UNIT, Quartz, 109.176 MC	26207-1091
Y113	CRYSTAL UNIT, Quartz, 110.176 MC	26207-1101
Y114	CRYSTAL UNIT, Quartz, 111.176 MC	26207-1111
Y115	CRYSTAL UNIT, Quartz, 112.176 MC	26207-1121
Y116	CRYSTAL UNIT, Quartz, 113.176 MC	26207-1131
Y117	CRYSTAL UNIT, Quartz, 114.176 MC	26207-1141

Reference Designation	Description	Part No.
	RECEIVER-TRANSMITTER - Continued	
Y118	CRYSTAL UNIT, Quartz, 115.176 MC	26207-1151
Y119	NOT USED	
Y120	CRYSTAL UNIT, Quartz, 21.824 MC	26206-2182
Y121	CRYSTAL UNIT, Quartz, 21.874 MC	26206-2187
Y122	CRYSTAL UNIT, Quartz, 21.924 MC	26206-2192
Y123	CRYSTAL UNIT, Quartz, 21.974 MC	26206-2197
Y124	CRYSTAL UNIT, Quartz, 22.024 MC	26206-2202
Y125	CRYSTAL UNIT, Quartz, 22.074 MC	26206-2207
Y126	CRYSTAL UNIT, Quartz, 22.124 MC	26206-2212
Y127	CRYSTAL UNIT, Quartz, 22.174 MC	26206-2217
Y128	CRYSTAL UNIT, Quartz, 22.224 MC	26206-2222
Y129	CRYSTAL UNIT, Quartz, 22.274 MC	26206-2227
Y130	CRYSTAL UNIT, Quartz, 22.324 MC	26206-2232
Y131	CRYSTAL UNIT, Quartz, 22.374 MC	26206-2237
Y132	CRYSTAL UNIT, Quartz, 22.424 MC	26206-2242
Y133	CRYSTAL UNIT, Quartz, 22.474 MC	26206-2247
Y134	CRYSTAL UNIT, Quartz, 22.524 MC	26206-2252
Y135	CRYSTAL UNIT, Quartz, 22.574 MC	26206-2257
Y136	CRYSTAL UNIT, Quartz, 22.624 MC	26206-2262
Y137	CRYSTAL UNIT, Quartz, 22.674 MC	26206-2267
Y138	CRYSTAL UNIT, Quartz, 22.724 MC	26206-2272
Y139	CRYSTAL UNIT, Quartz, 22.774 MC	26206-2277
Y201	CRYSTAL UNIT, Quartz, 96.176 MC	26207-9617
Y202	CRYSTAL UNIT, Quartz, 97.176 MC	26207-9717
Y203	CRYSTAL UNIT, Quartz, 98.176 MC	26207-9817
Y204	CRYSTAL UNIT, Quartz, 99.176 MC	26207-9917
Y205	CRYSTAL UNIT, Quartz, 100.176 MC	26207-1001
Y206	CRYSTAL UNIT, Quartz, 101.176 MC	26207-1011
Y207	CRYSTAL UNIT, Quartz, 102.176 MC	26207-1021
Y208	CRYSTAL UNIT, Quartz, 103.176 MC	26207-1031
Y209	CRYSTAL UNIT, Quartz, 104.176 MC	26207-1041
Y210	CRYSTAL UNIT, Quartz, 105.176 MC	26207-1051
Y211	CRYSTAL UNIT, Quartz, 106.176 MC	26207-1061
Y212	CRYSTAL UNIT, Quartz, 107.176 MC	26207-1071
Y213	CRYSTAL UNIT, Quartz, 108.176 MC	26207-1081
Y214	CRYSTAL UNIT, Quartz, 109.176 MC	26207-1091
Y215	CRYSTAL UNIT, Quartz, 110.176 MC	26207-1101
Y216	CRYSTAL UNIT, Quartz, 111.176 MC	26207-1111
Y217	CRYSTAL UNIT, Quartz, 112.176 MC	26207-1121
Y218	CRYSTAL UNIT, Quartz, 113.176 MC	26207-1131
Z201	FILTER ASSEMBLY	28289
Z202	REACTOR	27606
	DYNAVERTER	
C301	CAPACITOR, Fixed, electrolytic, 250 μf, 25 vdcw	BRH-10112
C302	CAPACITOR, Fixed, plastic, 1 μf ±10 per cent, 100 vdcw	26053-9101
C303	CAPACITOR, Fixed, same as C302	
C304	CAPACITOR, Fixed, electrolytic, 120 μf ±20 per cent, 10 vdcw	150D127X0010R2
C305	CAPACITOR, Fixed, electrolytic, 60 μf +75 -15 per cent, 50 vdcw	F310
C306	CAPACITOR, Fixed, electrolytic, four sections, 10 μf +50 -10 per cent, 450 vdcw ea section	27153
C307	CAPACITOR, Fixed, same as C305	
C308	CAPACITOR, Fixed, electrolytic, 3 μf, 300 vdcw	S10305
C309	NOT USED	
C310	CAPACITOR, Fixed, same as C308	

Reference Designation	Description	Part No.
	DYNAVERTER - Continued	
CR301	SEMICONDUCTOR DEVICE, Diode	DI55
CR302	SEMICONDUCTOR DEVICE, Diode, same as CR301	
CR303	SEMICONDUCTOR DEVICE, Diode, same as CR301	
CR304	SEMICONDUCTOR DEVICE, Diode, same as CR301	
CR305	SEMICONDUCTOR DEVICE, Diode, same as CR301	
J301	CONNECTOR, Receptacle, electrical	126-806
J302	CONNECTOR, Receptacle, electrical	126-218
K301	RELAY, Armature (used in 14 v model)	25722-0014
K301	RELAY, Armature (used in 28 v model)	25722-0028
K302	RELAY, Armature (used in 14 v model)	14484
K302	RELAY, Armature (used in 28 v model)	14485
L301	REACTOR, 1.2 μh	L-2254
L302	COIL, RF, 22 mh ±20 per cent	05-225
L303	COIL, RF, 1000 μh ±5 per cent	28876-0102
L304	COIL, RF, same as L303	
L305	COIL, RF, same as L303	
L306	COIL, RF, same as L303	
L307	REACTOR, 1 h	L-3247
Q301	TRANSISTOR, Type 2N270	2N270
Q302	TRANSISTOR, Type 2N1545 (used in 14 v model)	2N1545
Q302	TRANSISTOR, Type 2N1546 (used in 28 v model)	2N1546
Q303	TRANSISTOR, Same as Q302 (14 v or 28 v model)	
Q304	TRANSISTOR, Type 2N176 (used in 14 v model)	2N176
Q304	TRANSISTOR, Type 2N375 (used in 28 v model)	2N375
Q305	TRANSISTOR, Same as Q304 (14 v or 28 v model)	
Q306	TRANSISTOR, Same as Q304 (14 v or 28 v model)	
Q307	TRANSISTOR, Same as Q304 (14 v or 28 v model)	
R301	RESISTOR, Fixed, comp, 220 ohms ±5 per cent, 1/2 w	EB2215
R302	RESISTOR, Fixed, comp, 2000 ohms ±5 per cent, 1/2 w	EB2025
R303	RESISTOR, Fixed, comp, 510 ohms ±5 per cent, 1 w (used in 14 v model)	GB5115
R303	RESISTOR, Fixed, comp, 2700 ohms ±5 per cent, 1 w (used in 28 v model)	GB2725
R304	RESISTOR, Fixed, same as R303 (14 v or 28 v model)	
R305	RESISTOR, Fixed, comp, 20 ohms ±5 per cent, 1/2 w (used in 14 v model)	EB2005
R305	RESISTOR, Fixed, comp, 47 ohms ±5 per cent, 1/2 w (used in 28 v model)	EB4705
R306	RESISTOR, Fixed, same as R305 (14 v or 28 v model)	
R307	RESISTOR, Variable, comp, 500 ohms ±20 per cent, 1/2 w	U-65LT
R308	RESISTOR, Fixed, comp, 10 ohms ±5 per cent, 1/2 w	EB1005
R309	RESISTOR, Fixed, comp, 68 ohms ±5 per cent, 1/2 w (used in 14 v model)	EB6805
R309	RESISTOR, Fixed, comp, 510 ohms ±5 per cent, 1/2 w (used in 28 v model)	EB5115

Reference Designation	Description	Part No.
	DYNAVERTER - Continued	
R310	RESISTOR, Fixed, comp, 1000 ohms ±5 per cent, 1/2 w (used in 14 v model)	EB1025
R310	RESISTOR, Fixed, comp, 5100 ohms ±5 per cent, 1/2 w (used in 28 v model)	EB5125
R311	NOT USED	
R312	RESISTOR, Fixed, comp, 15 ohms ±5 per cent, 1 w	GB1505
R313	RESISTOR, Variable, comp, 250 ohms ±20 per cent, 1 w	90LT251M
R314	RESISTOR, Fixed, comp, 470,000 ohms ±5 per cent, 1/2 w	EB4745
R315	RESISTOR, Fixed, same as R314	
R316	RESISTOR, Fixed, ww, 4 ohms ±3 per cent, 25 w (used in 28 v model only)	RH25-4R0H
R317	RESISTOR, Variable, same as R313	
R318	RESISTOR, Fixed, comp, 510 ohms ±5 per cent, 1/2 w	EB5115
R319	RESISTOR, Fixed, comp, 1000 ohms ±5 per cent, 1/2 w	EB1025
R320	RESISTOR, Fixed, same as R319	
R321	RESISTOR, Fixed, same as R319	
R322	RESISTOR, Fixed, same as R318	
R323	RESISTOR, Fixed, same as R318	
R324	RESISTOR, Fixed, comp, 330 ohms ±5 per cent, 1/2 w	EB3315
R325	RESISTOR, Fixed, same as R318	
R326	RESISTOR, Fixed, same as R324	
R327	RESISTOR, Fixed, same as R318	
R328	RESISTOR, Fixed, comp, 5600 ohms ±5 per cent, 1 w	GB5625
R329	NOT USED	
R330	NOT USED	
R331	RESISTOR, Fixed, comp, 18,000 ohms ±5 per cent, 2 w	HB1835
R332	RESISTOR, Fixed, comp, 6800 ohms ±5 per cent, 2 w	HB6825
R333	RESISTOR, Fixed, comp, 820 ohms ±5 per cent, 2 w	HB8215
R334	RESISTOR, Fixed, comp, 5100 ohms ±5 per cent, 2 w	HB5125
R335	RESISTOR, Fixed, comp, 6800 ohms ±5 per cent, 1/2 w	EB6821
R336	NOT USED	
R337	NOT USED	
R338	NOT USED	
R339	NOT USED	
R340	RESISTOR, Fixed, comp, 470 ohms ±5 per cent, 1 w (used in 14 v model)	GB4725
R340	RESISTOR, Fixed, comp, 5600 ohms ±5 per cent, 1 w (used in 28 v model)	GB5625
R341	RESISTOR, Fixed, comp, 10 ohms ±5 per cent, 1 w	GB1005
R342	NOT USED	
R343	NOT USED	
R344	RESISTOR, Variable, comp, 5000 ohms ±30 per cent, 3 w	type 70
RT301	RESISTOR, Thermal, 10 ohms ±10 per cent at 25 deg C	11-TE2

Reference Designation	Description	Part No.
	DYNAVERTER - Continued	
T301	TRANSFORMER, Audio	AR-817
T302	TRANSFORMER (used in 14 v model)	28788-0014
T302	TRANSFORMER (used in 28 v model)	28788-0028
T303	TRANSFORMER, Audio driver	AR-816
T304	TRANSFORMER, Modulation (used in 14 v model)	AR-818
T304	TRANSFORMER, Modulation (used in 28 v model)	AR-819
T305	NOT USED	
T306	NOT USED	
T307	NOT USED	
T308	NOT USED	
T309	NOT USED	
T310	TRANSFORMER, Audio	28779
W301	CABLE, Coaxial	18327
W302	CABLE, Coaxial, same as W301	

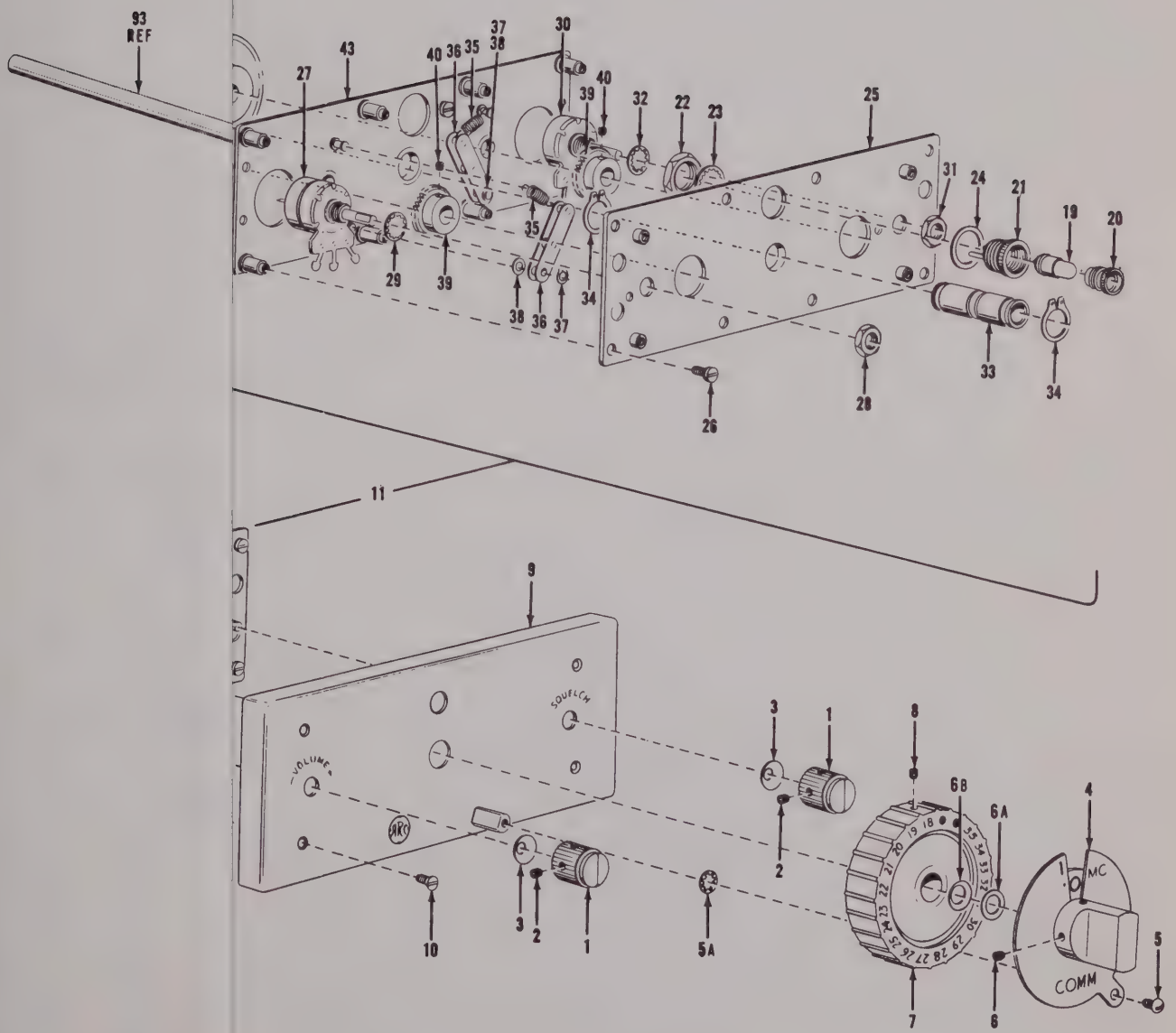


Figure 1-19. Receiver-Transmitter, Exploded View

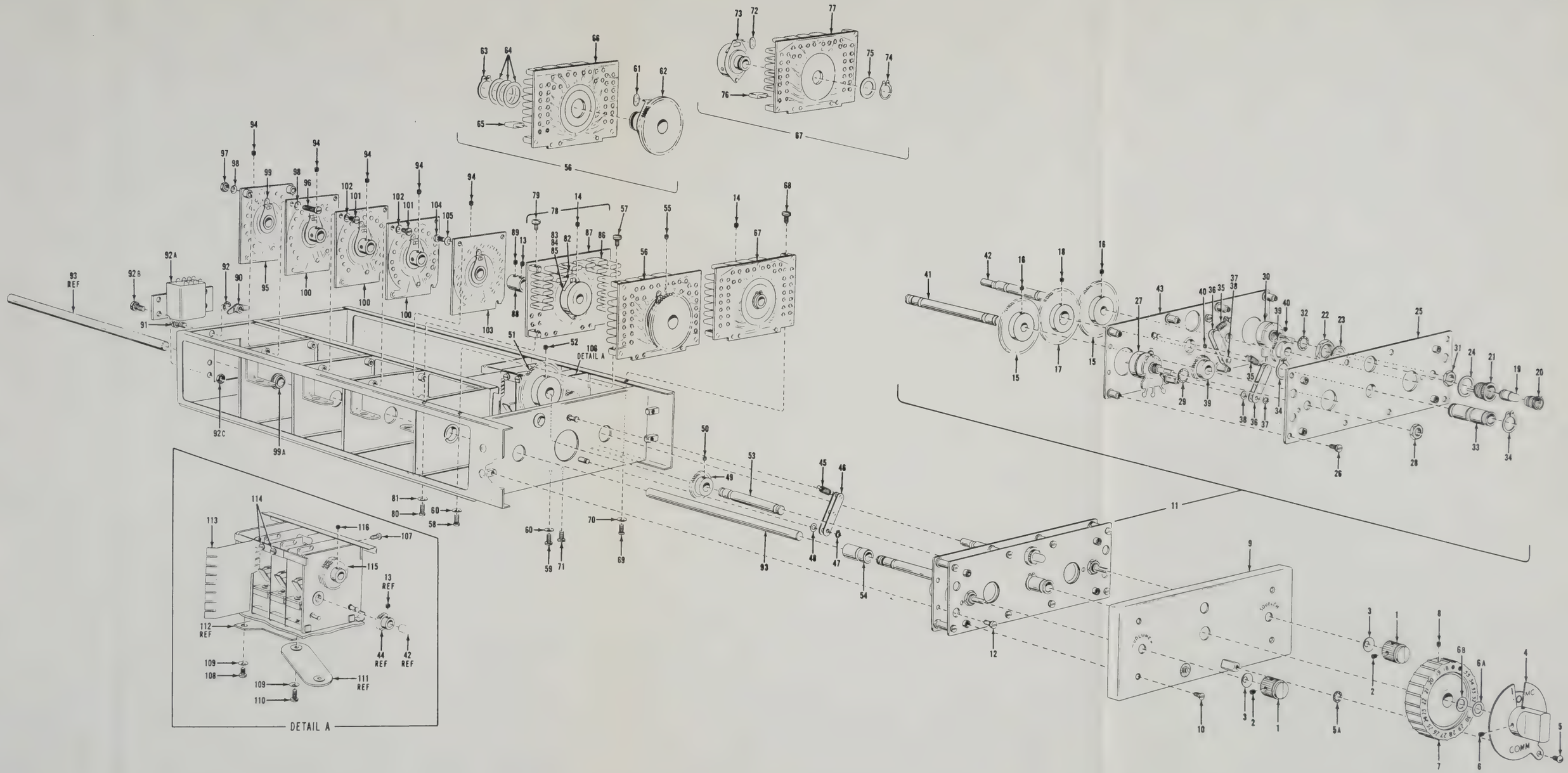


Figure 1-19. Receiver-Transmitter, Exploded View

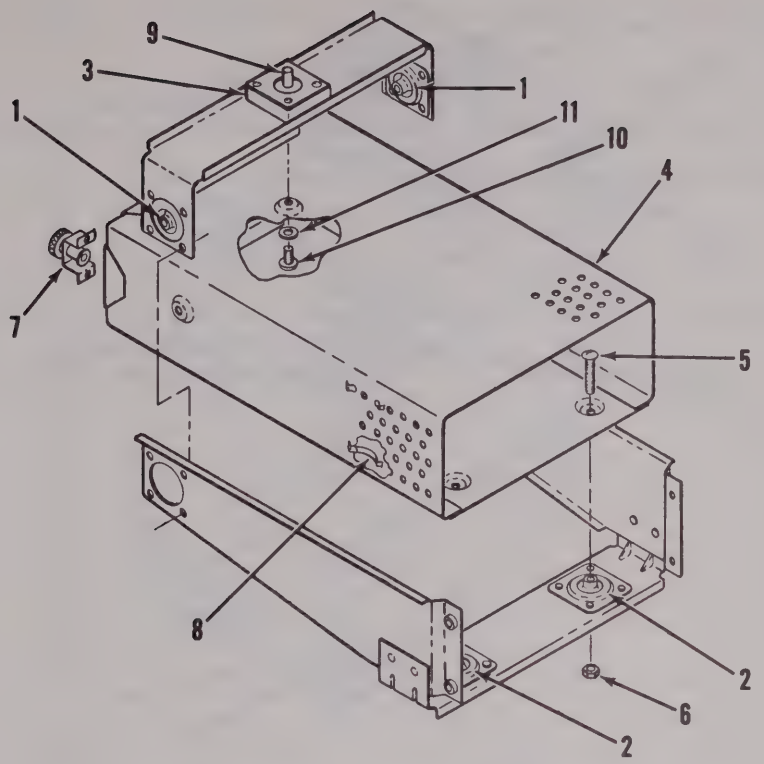


Figure 1-20. Mounting Assembly, Panel

Figure & Index No.	Part No.	Description 1 2 3 4 5 6	Units per Assy
		MOUNT	
1-20-	26780	MOUNTING ASSEMBLY, Panel	1
-1	27141-0002	. ABSORBER, Shock	2
-2	27141-0003	. ABSORBER, Shock	2
-3	8906-0003	. DAMPER, Type J	1
-4	26916	. COVER ASSEMBLY	1
		(ATTACHING PARTS)	
-5	27184	. SCREW	4
-6	2653	. NUT	4
		- - - * - - -	
-7	29014	. . NUT ASSEMBLY	2
-8	30615	. SPRING, Formed Contact	4
-9	21653	. POST	1
		(ATTACHING PARTS)	
-10	106-0024	. SCREW	1
-11	4316	. LOCKWASHER	1
		- - - * - - -	

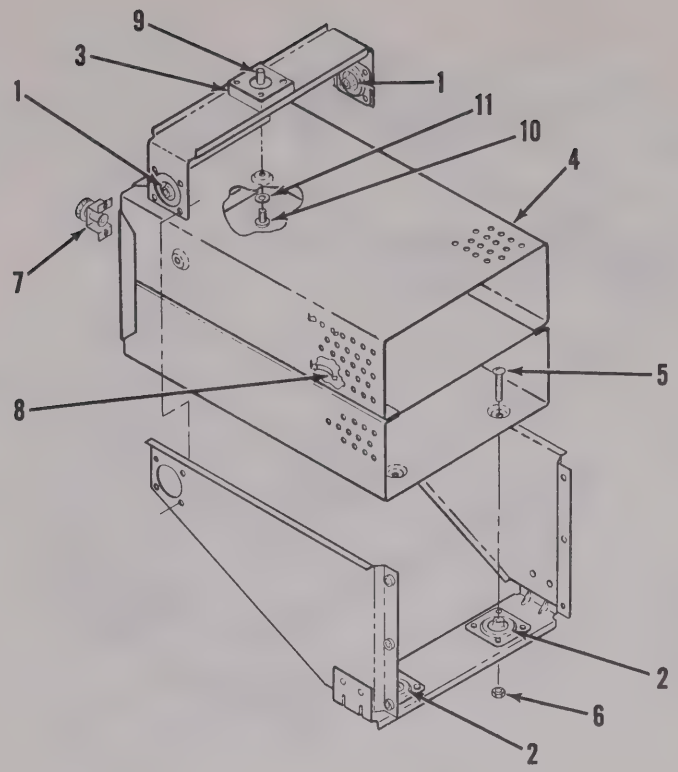


Figure 1-21. Mounting Assembly, Panel

Figure & Index No.	Part No.	Description 1 2 3 4 5 6	Units per Assy
		MOUNT	
1-21-	26790	MOUNTING ASSEMBLY, Panel	1
-1	27141-0003	. ABSORBER, Shock	2
-2	27141-0004	. ABSORBER, Shock	2
-3	8906-0003	. DAMPER, Type J	1
-4	27185	. COVER ASSEMBLY	1
		(ATTACHING PARTS)	
-5	27184	. SCREW	4
-6	8653	. NUT	4
		- - - * - - -	
-7	29014	. . NUT ASSEMBLY	4
-8	30615	. SPRING, Formed Contact	8
-9	21653	. POST	1
		(ATTACHING PARTS)	
-10	106-0024	. SCREW	1
-11	4316	. LOCKWASHER	1
		- - - * - - -	

Figure & Index No.	Part No.	Description 1 2 3 4 5 6	Units per Assy
		MOUNT	
	24900	MOUNTING ASSEMBLY	1
		MOUNT	
	27591 29014	MOUNTING ASSEMBLY, Panel . NUT ASSEMBLY	1 2
		MOUNT	
	27594 29014	MOUNTING ASSEMBLY, Panel . NUT ASSEMBLY	1 4

SECTION 2

CESSNA NAV/COM 500

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INSERT LATEST REVISED PAGES. DESTROY SUPERSEDED PAGES.

CESSNA NAV/COM 500

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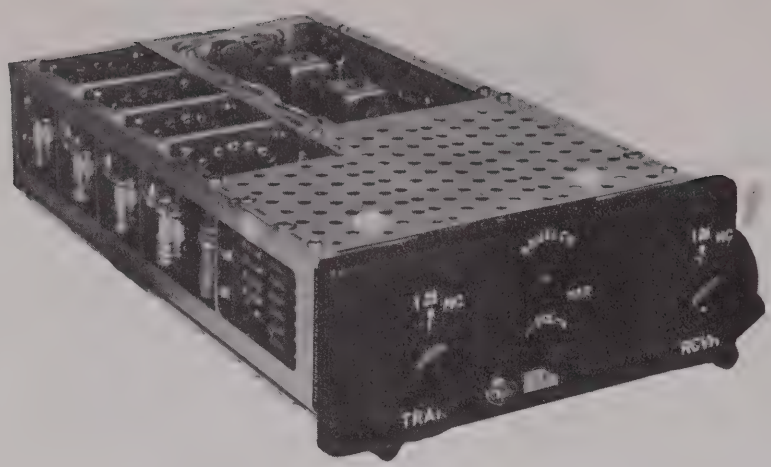
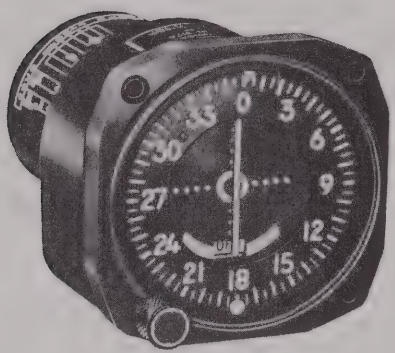
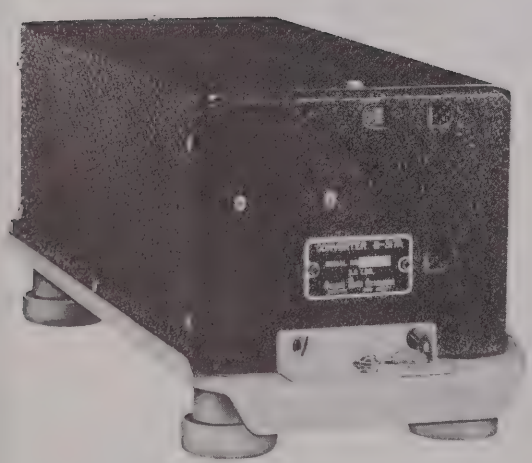


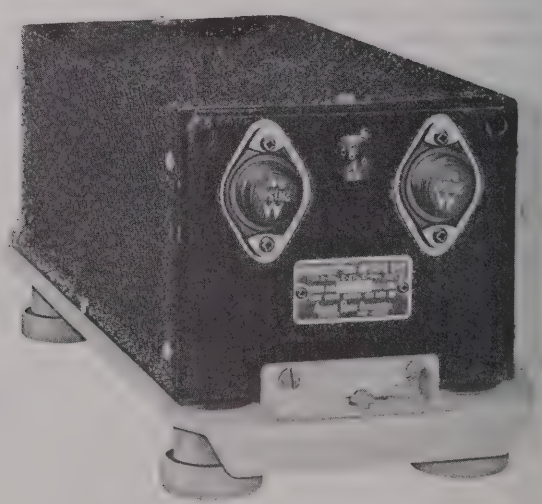
RECEIVER - TRANSMITTER



INDICATOR



CONVERTER WITH MOUNTING



DYNAVERTER WITH MOUNTING

Figure 2-1. Cessna Nav/Com 500 Set, Major Units

CESSNA NAV/COM 500

General Information

INTRODUCTION.

This instruction book contains installation, operation, principles of operation, maintenance, and parts information for the Cessna 500 Communication-Navigation Set.

PURPOSE.

The Nav/Com 500 is an airborne, 380-channel*, vhf communication-navigation radio receiver and a 360-channel, voice amplitude-modulated transmitter. The set receives and interprets vhf omnidirectional range (VOR) and localizer signals; receives vhf communications between 118.00 and 126.95 mc; and transmits on any of 360 crystal-controlled, 50-kc spaced, vhf channels between 118.00 and 135.95 mc.

A three-light marker beacon receiver is included with the Nav/Com 500. The marker beacon receiver provides visual and aural indications of 75-mc airway and ILS marker signals.

SPECIFICATIONS.

Over-all Characteristics.

Input Power: Receive: 5.2 amperes at 13.75 volts dc
2.6 amperes at 27.5 volts dc
Transmit: 7.8 amperes at 13.75 volts dc
3.8 amperes at 27.5 volts dc

Weight: 12.3 pounds (including indicator but excluding mountings, connectors, and interconnecting wires)

Certification: FAA TSO C36, C37, and C40
Catagory B

Receiver-Transmitter.

General.

Mounting: Type 26780, 26790, 27591, or 27594

Weight: 4.4 pounds; 5.65 pounds with 26780; 6.15 pounds with 26790; 5.15 pounds with 27591; 5.65 pounds with 27594.

Receiver:

Circuit: 10-tube, triple-conversion superheterodyne

Frequency Range: 108.00 to 126.95 mc

Number of Channels: 380

Channel Spacing: 100 kc, from 108.00 to 117.90 mc
50 kc, from 118.00 to 126.95

Input Impedance: 52 ohms (nominal)

*The receiver is capable of receiving 380 channels, spaced 50 kc apart, between 108.00 and 126.95 mc; however, between 108.00 and 117.90 mc (navigation band) allocated channels are spaced 100 kc apart.

Sensitivity: Less than 2.0 uv for 6 db S+N/N, 30% modulation, 1000 cps at audio output of 2 watts

Audio Output Capability: 5 watts into 4-ohm speaker

Audio Output: 50 mw minimum into 300-ohm load

Audio Frequency Response: Within 6 db from 350 cps to 3000 cps

AGC: Less than 4 db from 10 to 100,000 uv

I-f Rejection: At least 90 db

Image Rejection: At least 65 db

Other Spurious Rejection: At least 60 db

Selectivity: 40 kc, 6 db down
98 kc, 60 db down

Total Harmonic Distortion: Less than 15% with 20,000 uv, 1000 cps, 85% modulation

Squelch: Carrier operated, adjustable from 0 to 5 uv

Tube Complement:
5654 R-f Amplifier
5654 First Mixer
6922 (1/2) Second Mixer
5749 2.0-mc I-f Amplifier
5750 Converter
5749 First 455-kc I-f Amplifier
5749 Second 455-kc I-f Amplifier
5670 Receiver Megacycle Oscillator and Receiver Fractional Oscillator
5814 Second Audio Amplifier and Navigation Cathode Follower
5751 First Audio Amplifier and Squelch Control

Diode Complement:
HD6226 Navigation Detector
HD6226 Automatic Noise Limiter
HD6226 Avc Clamp
HD6226 Audio and Avc Detector
HD6226 Avc Attack Diode

Transmitter.

Frequency Range: 118.00 to 135.95 mc

Number of Channels: 360

Channel Spacing: 50 kc

Power Output: 5 watts nominal (4.5 watts minimum)

Modulation: High-level with automatic limiting at 100% modulation

Modulation Capability: Less than 0.25 volt rms input in series with 100 ohms required for 100% modulation

Spurious Output: Less than 50 mw

Tube Complement:

6922 (1/2)	Transmitter Megacycle Oscillator
5686	Power Amplifier
5686	Driver
6688	Buffer
6922	Balanced Mixer

Converter.

VOR Accuracy: ±0.3° maximum, with ±10% variation of supply voltage
±1° maximum, over temperature range of -40°C to +55°C
±2.5°, including course selector

LOC Accuracy: ±3 ua maximum, with ±10% variation of supply voltage
±4 ua maximum, over temperature range of -40°C to +55°C
±4 ua maximum, with variation in ground-station power frequency

Tube Complement:

5670	Reference Channel 10 kc and 30 cps Amplifier
5670	Reference Channel Cathode Follower
5751	Reference Channel 30 cps Amplifier
5670	Common Channel Amplifier and Cathode Follower
5670	Variable Channel 30-cps Amplifier and Cathode Follower

Diode Complement:

HD6226 (2)	Reference Channel Limiter
HD6226 (2)	Discriminator
1N118 (2)	Off/To-From Diode
1N2610 (2)	Phase Detector
HD6226	Localizer Flag Diode
1N118 (2)	Localizer Detector

Mounting: Type 24900

Weight: 3.2 pounds; 3.7 pounds including 24900 Mounting

Dynaverter.

Maximum Temperature Rise: 25°C

Audio Output: 4 watts minimum

Power Output Characteristics:

Output Voltage		Output Current	Ripple
104 VDC:	Rec	28 ma	2 mv
	Trans	-----	-----
140 VDC:	Rec	8 ma	250 mv
	Trans	45 ma	400 mv
280 VDC:	Rec	51 ma	40 mv
	Trans	115 ma	30 mv

Transistor Complement:

14V Units	28V Units	Name
2N270	2N270	Microphone Amplifier
2N176	2N375	Audio Driver
2N176	2N375	
2N176	2N375	Audio Output
2N176	2N375	
2N1545	2N1546	Multivibrator
2N1545	2N1546	
2N384	2N384	Autodyne
2N384	2N384	I-f Amplifier
2N384	2N384	Amplifying Detector
2N647	2N647	Audio Amplifier
2N1183	2N1183	400-cps Lamp Amplifier
2N1183	2N1183	1300-cps Lamp Amplifier
2N1183	2N1183	3000-cps Lamp Amplifier

Diode Complement:

1N2070	Bridge Rectifier
1N2070	
1N2070	
1N2070	
1N1826	Voltage Regulator
1N1833	Voltage Regulator
1N118	Limiter

Mounting: 24900

Weight: Dynaverter - 3.8 pounds; 4.3 pounds including 24900 Mounting

Weight: Indicator - 1.5 pounds

DESCRIPTION.

Receiver-Transmitter. The Nav/Com 500 Receiver-Transmitter is a panel-mounted vhf communication-navigation receiver and a vhf transmitter. Independent manual tuning controls for the receiver and transmitter are located on the front panel. The receiver and transmitter may be operated simultaneously on the same frequency or independently on any selected frequency. A volume control and on-off switch, a squelch control, and an audio control for the optional marker beacon receiver are also mounted on the front panel.

The transmitter and receiver use crystal-saving circuits that require only 58 crystals to control the 380 receiver channels and the 360 transmitter channels. The crystals are divided into three groups: A receiver whole-megacycle group, a transmitter whole-megacycle group, and a common fractional megacycle group. Each group is mounted on a separate crystal switch. Since the transmitter and receiver always operate on the same "fraction of a megacycle," a single oscillator is used to supply the mixing frequency. The mixing frequency is controlled by any one of 20 crystals on the fractional megacycle crystal switch. The fractional megacycle crystals cover the frequency range of 21.824-22.774 mc in 0.05-mc steps. The transmitter and receiver megacycle crystals cover the ranges 96.176-113.176 mc and 88.176-106.176 mc, respectively, in 1.0-mc steps.

The receiver, a triple-conversion superheterodyne, operates between 108.00 and 126.95 mc. It provides an aural output for headset or speaker operation and a navigation output which is fed to the Converter. The transmitter is an amplitude-modulated circuit with a frequency range of 118.00-135.95 mc and a power output greater than 4.5 watts.

Converter. The converter is a five-tube unit that accepts VOR and localizer signals from the Receiver-Transmitter and converts these signals to a form presented visually by the Course Indicator. The unit has no operating controls. All operating voltages are received from the dynaverter and the external low-voltage power source. All input and output connections to the unit are made through a connector mounted on the rear of the chassis.

Dynaverter. The dynaverter is a transistorized unit that contain an audio amplifier-modulator and supplies high voltage to the receiver-transmitter and converter. Input and output connections are made through a connector on the rear of the unit.

The marker beacon receiver contained in the dynaverter is an all-transistor assembly that provides signals for aural and three light visual indications of 75-mc marker beacon signals. The visual indications are provided by three lamp assemblies which are part of an optional, marker light kit. Each lamp assembly has a distinguishing colored jewel to identify the markers and their modulating frequencies: blue for ILS outer markers (400 cps), amber for ILS middle markers (1300 cps), and white for Z markers and fan markers (3000 cps).

Indicator. The indicator is a combined deviation indicator, course selector, and off/to-from meter. The OFF/TO-FROM meter indicates either TO or FROM when a reliable VOR signal is received and TO when a reliable localizer signal is received.

The pointer indicates the VOR or localizer information received from the converter circuits. It is pivoted at the top and moves left or right to supply an indication of the aircraft's lateral position with respect to the on-course signal of the VOR or localizer.

The course selector portion of the indicator permits selection of any course to or from a VOR station, or indicates the magnetic bearing of the aircraft with relation to a VOR station. The course selector dial is graduated in a compass scale of 360°. A triangle-shaped pointer is used for the course indication and a ball for the reciprocal indication on the course indicator scale. The OFF/TO-FROM meter is a zero-center d-c instrument that provides the sense information required to resolve the ambiguity in the indicator reading. The meter will show TO when the indicator bearing on the indicator dial is the magnetic bearing to the station, or FROM when the bearing on the indicator dial is the magnetic bearing from the station. When the OFF/TO-FROM meter is read the vertical pointer should be approximately centered. The OFF portion of the meter indicates that the signal being received is too weak to be reliable or that the equipment is not operating properly.

Mountings. The 26780 mounting and 26790 mounting are used to shock-mount one or two receiver-transmitters, respectively. The mounting also serves as a dust cover for the unit. The panel unit is secured by captive knurled nuts at the rear of the mounting. The mounting fits into a panel cutout and is secured to panel flanges by No. 6 flat head screws.

Where shock-mounting is not required, the 27591 and 27594 mountings are used for mounting one or two receiver-transmitters, respectively.

The 24900 mounting is used for the converter and the dynaverter. Each unit is secured to its mounting by a snap-slide which engages a grooved stud on the mounting.

VOR AND ILS FREQUENCY ALLOCATIONS.

The FCC has allocated certain frequency bands for aeronautical navigation and communication facilities. Localizer and VOR facilities are located between 108.00 and 117.95 mc, communication facilities between 118.00 and 135.00 mc, and glide slope facilities between 328.6 and 335.4 mc.

Within the localizer VOR band, specific frequencies are assigned to each facility as follows: all odd-tenth-megacycle frequencies, beginning with 108.0 mc and ending with 111.9 mc, are localizer frequencies. All even-tenth-megacycle frequencies, beginning with 108.2 mc and ending with 112.0 mc, are VOR frequencies. The remaining frequencies, from 112.1 to 117.9 mc, both odd and even tenths, are assigned to VOR facilities only.

The glide slope frequency band is divided into four frequency groups related to the 108-, 109-, 110-, and 111-mc localizer bands. In each group, five glide slope frequencies are paired with specific localizer frequencies as listed in the following table.

LOCALIZER AND GLIDE SLOPE FREQUENCIES

Localizer Frequency	Glide Slope Frequency	Localizer Frequency	Glide Slope Frequency
108.1	334.7	110.1	334.4
108.3	334.1	110.3	335.0
108.5	329.9	110.5	329.6
108.7	330.5	110.7	330.2
108.9	329.3	110.9	330.8
109.1	331.4	111.1	331.7
109.3	332.0	111.3	332.3
109.5	332.6	111.5	332.9
109.7	333.2	111.7	333.5
109.9	333.8	111.9	331.1

CESSNA NAV/COM 500

Installation and Adjustment

PRE-INSTALLATION TESTS.

Test Equipment. The Nav/Com 500 should be bench-tested before installation. The following equipment, or equivalent, is required for the tests:

(1) Low voltage d-c power supply capable of delivering 7.8 amperes at 13.75 volts or 3.8 amperes at 27.5 volts. The voltage required will depend on the voltage rating of the Nav/Com 500.

(2) Headset, 300 ohms impedance.

(3) ARC Type H-14A Signal Generator or equivalent.

(4) Boonton Radio Type 505-B 6-db Attenuator.

(5) Bird Electronic Model 61 R-f Wattmeter.

(6) Microphone.

(7) Hewlett-Packard Model 608D VHF Signal Generator.

(8) Hewlett-Packard Model 200AB Audio Oscillator.

(9) Cable Harness Assembly (see figure 2-25).

Test Procedure.

Step 1. Interconnect Nav/Com 500 units as shown in Figure 2-15. Disconnect jumper between pins 16 and 18 of J301 of Dynaverter and connect headset between pin 18 and ground.

Step 2. Apply power to Nav/Com and the H-14A Signal Generator; allow a 15-minute warmup period. During the warmup period, check the receiver-transmitter and converter for lighted tube filaments and panel lamps.

Step 3. Connect H-14A RF OUTPUT ATTEN connector through the Boonton Radio Type 505-B Attenuator to J101 on the Nav/Com. (To obtain H-14A hard microvolt readings refer to Performance Checks).

Step 4. Adjust H-14A controls as outlined in H-14A Instruction Book, then set the controls as follows: OMNI TRACK to 0°, MC to position "B" (114.9 mc), MODULATION to OMNI, IDENTIFIER to ON, and ATTENUATOR to 5 uv.

Step 5. Channel Nav/Com to 114.90 mc and set SQUELCH control maximum clockwise. Turn VOL control clockwise until H-14A identification signal is clearly audible.

Step 6. Set H-14A ATTENUATOR dial to 10K uv. Set course pointer to 0°. The pointer should center and the OFF/TO-FROM meter should indicate TO.

Step 7. Observe pointer while slowly decreasing H-14A output to 10 uv. The pointer should not move out of the circle in the center of the indicator and the OFF/TO-FROM meter should indicate TO.

Step 8. Set H-14A ATTENUATOR dial to 100 uv. Rotate course selector knob for a pointer reading of 5 dots to the left and note course selector reading. Rotate CRS SEL knob for a pointer reading of 5 dots to the right and note course selector reading. If necessary, adjust R456 to obtain a course width of 20°±1°.

Step 9. Replace H-14A "B" crystal (114.9 mc) with a 110.8 mc crystal. Tune Nav/Com to 110.8 mc. Repeat Steps 6 and 7.

Step 10. Set H-14A MC knob to A (110.9 mc) and MODULATION knob to AMP LOC (↓) (pointer center). Set ATTENTUATOR dial to 10K uv.

Step 11. Tune Nav/Com to 110.90 mc. The pointer should center and the OFF/TO-FROM meter indicate TO.

Step 12. Observe pointer while slowly decreasing H-14A output to 10 uv. The pointer should not move out of the circle in the center of the indicator. The OFF/TO-FROM meter should indicate TO.

Step 13. Set MODULATION knob to AMP LOC (↙) (pointer left). Set ATTENUATOR dial to 1K uv. The vertical pointer should swing to within one pointer width of the outer edge of blue sector on indicator dial.

Step 14. Set MODULATION knob to AMP LOC (↘) (pointer right). Vertical pointer should swing to within one pointer width of outer edge of yellow sector.

Step 15. Disconnect H-14A from Nav/Com Connect Bird Electronic Model 61 Wattmeter to J201 on Nav/Com and tune to 118.0 mc and key the transmitter. R-f output should be at least 4 watts.

Step 16. Key transmitter at each available channel. R-f power output should be at least 4 watts on each channel.

CAUTION

Do not key the transmitter when TRANS MC

selector is set to either of the two positions, indicated by red dots, between 135 and 118 mc.

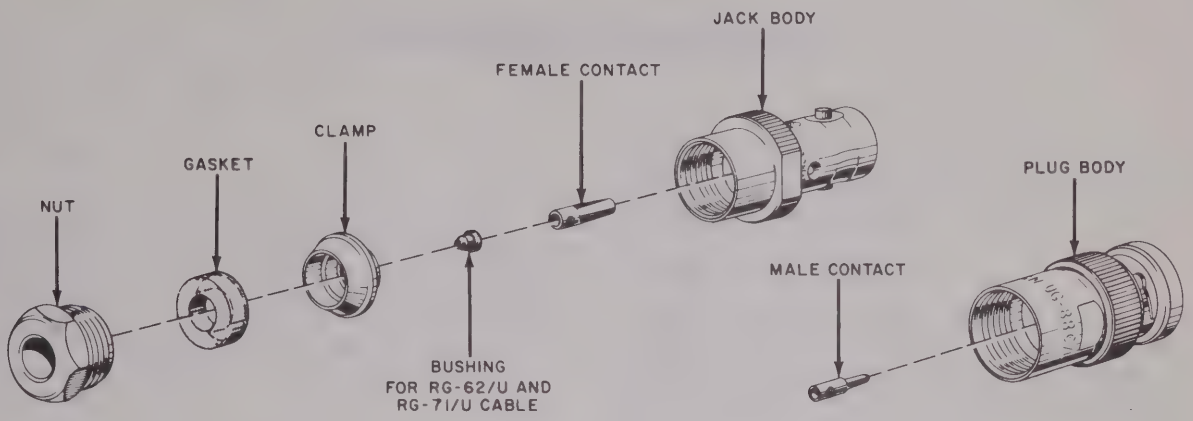
Step 17. Disconnect r-f wattmeter from Nav/Com.

Step 18. Test the marker beacon receiver as follows: Connect the RF OUTPUT of Hewlett-Packard Model 608D Signal Generator to marker beacon receiver antenna connector on the dynaverter. Tune signal generator for an output of 3 mv at 75 mc. Modulate signal generator output with a 95% 400-cps audio signal. Blue marker lamp should light.

Step 19. Modulate signal generator output with a 95% 1300-cps audio signal. Amber marker lamp should light.

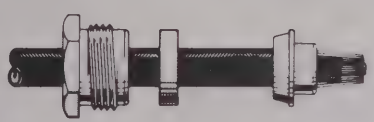
Step 20. Modulate signal generator output with a 95% 3000-cps audio signal. White marker lamp should light.

Step 21. Disconnect equipment.



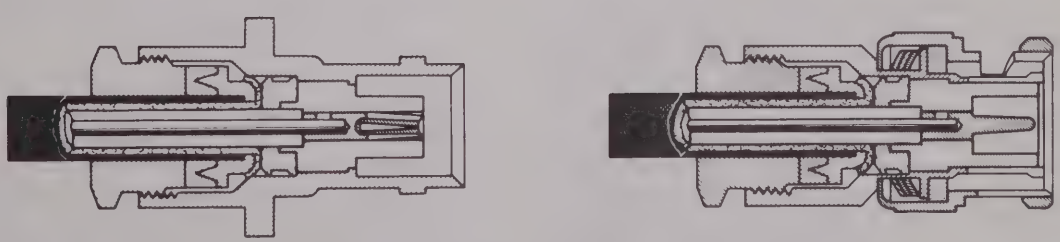
PLACE NUT AND GASKET OVER CABLE AND TRIM JACKET TO DIMENSION SHOWN. UNGROOVED FACE OF GASKET MUST BE TOWARD NUT.

COMB OUT BRAID AND CUT CABLE DIELECTRIC TO DIMENSION SHOWN, BEING CAREFUL NOT TO NICK CENTER CONDUCTOR. TIN CENTER CONDUCTOR.



PULL BRAID WIRES FORWARD AND TAPER TOWARD CENTER CONDUCTOR. PLACE CLAMP OVER BRAID AND PUSH AGAINST CABLE JACKET.

FOLD BACK BRAID WIRES AS SHOWN, TRIM TO PROPER LENGTH, AND FORM OVER CLAMP AS SHOWN. FOR RG-62/U AND RG-71/U CABLE, SLIP BUSHING OVER CENTER CONDUCTOR AND UNDER DIELECTRIC. SOLDER CONTACT TO CENTER CONDUCTOR.



INSERT CABLE AND PARTS INTO CONNECTOR BODY. MAKE SURE SHARP EDGE OF CLAMP SEATS PROPERLY IN GASKET. TIGHTEN NUT.

Figure 2-2. Fabrication of Typical Antenna Cable Assembly

CESSNA NAV/COM 500

Principles of Operation

INTRODUCTION.

General. This section describes the principles of operation of the Nav/Com 500 Communication-Navigation Set and its individual units. An over-all functional description of the set if followed by detailed descriptions of each unit's circuits. Block diagrams are included to supplement the circuit descriptions. Schematic diagrams are shown in Figures 2-16, 2-19, 2-22 and 2-24.

FUNCTIONAL DESCRIPTION.

Power Distribution. When the on-off switch, controlled by the VOL control, is closed, primary voltage is connected to the dynaverter and to the filaments of the panel unit and converter. The high voltage developed by the dynaverter is distributed to the panel unit and converter. Power for the panel lamps must be supplied through a separate terminal, connected to the aircraft dimmer control.

The primary voltage is also connected to the common terminal of switch sections S101B and S101C. This voltage is used to energize VOR-localizer relay K401 in the converter when a localizer channel is selected (108.10 to 111.90 mc), and to disable the navigation output on all 50-kc channels between 108.00 and 117.90 mc.

Signal Distribution. With the Nav/Com tuned to an incoming signal, the signal picked up by the receiving antenna is fed through coaxial cable to the receiver input circuits. The r-f signal is amplified by the r-f and i-f stages. The output of the second 455-kc i-f amplifier consists of a navigation signal or communication signal, or both. The navigation signals are detected and routed through a cathode follower to the Converter. The communication signals are applied to a separate detector and a noise limiter and coupled to the audio output stages where squelch control is introduced and amplification of the signal takes place. The audio output of the receiver is fed to the audio distribution circuits.

With the receiver channeled to a VOR frequency, high voltage and the navigation portion of the VOR signal are fed through the normally closed contacts of VOR-localizer relay K401 in the converter to the variable channel and reference channel circuits. These circuits convert the signal into track information for presentation on the course indicator; also TO-FROM/flag information is fed to the TO-FROM/flag. With the receiver channeled to a localizer frequency, low-voltage dc is connected through switch S101B and the normally closed contacts of cam-actuated switch S103 to the solenoid of K401. With 401 energized, high voltage and the navigation portion of the localizer signal are fed to the localizer circuits where the signal is converted for visual presentation on the indicator.

RECEIVER-TRANSMITTER.

General. The Nav/Com is a navigation receiver, a communication receiver, and a communication transmitter. The receiver portion operates in the frequency range of 108.00 to 126.95 mc divided into two bands. The navigation band (108.00 to 117.90 mc) provides the capability for receiving all allocated 100-kc navigation channels. The communication band (118.00 to 126.95 mc) provides the capability for receiving all allocated 50-kc communication channels.

The communication transmitter is capable of transmitting a 5-watt amplitude-modulated signal on any 50-kc spaced channel between 118.00 and 135.95 mc.

Communication and Navigation Receiver. The receiver portion as shown in Figure 2-3, is a triple-conversion circuit employing nine and one-half miniture tubes. Tuning is manually controlled by the concentric fractional megacycle and whole megacycle knobs. A gear trail provides the mechanical linkage between the two knobs and their respective crystal switches. A four-gang tuning capacitor, which is mechanically linked to the megacycle knob, is used to tune the receiver. The received signal (108.00 to 126.95 mc) is amplified by a double-tuned r-f amplifier and fed to the first mixer. The output of the receiver megacycle oscillator (88.176 to 106.176 mc) is also fed to the first mixer. The mixer output (19.824 to 20.774 mc) is applied through a fixed-tuned, bandpass filter to a second mixer stage. The output of the fractional megacycle oscillator (21.824 to 22.774 mc) is also applied to the second mixer. The second mixer output is tuned to 2.0 mc.

The 2.0-mc signal is amplified and applied to a converter stage. A crystal-controlled, 1545-kc oscillator frequency is combined with the signal to produce a 455-kc i-f signal. The 455-kc signal is amplified to the navigation detector and the communication detector. The output of the navigation detector is coupled by the navigation cathode follower to the converter. The output of the communication detector is applied through an automatic noise limited to the first audio amplifier. The output of the first audio amplifier is coupled to the second audio amplifier which provides headphone output levels and drives the speaker amplifier in the dynaverter.

Receiver Circuit Details.

R-f Amplifier. The r-f amplifier uses a 5654

pentode, V101, with a tuned input and a tuned output circuit. Both tuned circuits are linked to the receiver megacycle channel selector switch. When a channel is selected, the circuits are tuned to pass the desired frequency, and the required receiver megacycle crystal is switched into the circuit.

The signal (108.00 to 126.95 mc) received by the antenna is connected through L131, a tap on L101, and C103 to the grid of V101. L101 is tuned by the parallel combination of C102, C188, and C101D. For each megacycle frequency, the direct gear drive from the megacycle channel selector switch positions C101D so that the resonant frequency with L101 is the frequency indicated on the front panel. The r-f signal is amplified by V101 and coupled to a double-tuned bandpass circuit composed of L102, L103, and C109, C101C and C108 are used to tune L102, C101B and C112 are used to tune L103. C113 couples the double-tuned output to the grid of the first mixer, V102.

Receiver Megacycle Oscillator. The receiver megacycle oscillator uses one half of a twin triode, V108A, in a grounded grid, series-mode, crystal oscillator circuit. This stage generates a megacycle r-f injection signal for the first mixer, V102. Depending on the setting of the receiver megacycle channel selector, one of 19 crystals is connected in the cathode circuit of V108A. The plate tank circuit consisting of L104 and C150 is tuned by C101A to resonate at the frequency of the selected crystal. Regenerative feedback is coupled from a tap on L104 through C155 to the selected crystal. C156 is used to neutralize stray capacitance introduced by the crystal leads. Z101 is connected across the selected crystal. This network neutralizes the crystal capacity to prevent "free running" of the oscillator on any frequency within range of the crystal frequencies. C152 is used for plate decoupling and C301 stabilizes operation of the stage during temperature variations. The output r-f signal is coupled through C151, L104, and C114 to V102.

First Mixer. The first mixer, V102, employs a 5654 pentode. The r-f amplifier output (108.00 to 126.95 mc) and the injection frequency (88.176 to 106.176 mc) from the receiver megacycle oscillator are mixed to produce a first intermediate frequency from 19.824 to 20.774 mc which is fed to the bandpass filter, T101.

First I-f Filter. T101 is a triple-tuned bandpass circuit connected between the first mixer, V102, and the second mixer, V103A. The filter is used for fractional megacycle tuning of the first i-f signal. The filter combines capacitive and inductive coupling to obtain a nearly symmetrical response characteristic. The filter output is connected to the grid of V103A. R111, connected between the grid of V103A and ground, provides the terminating impedance for the filter.

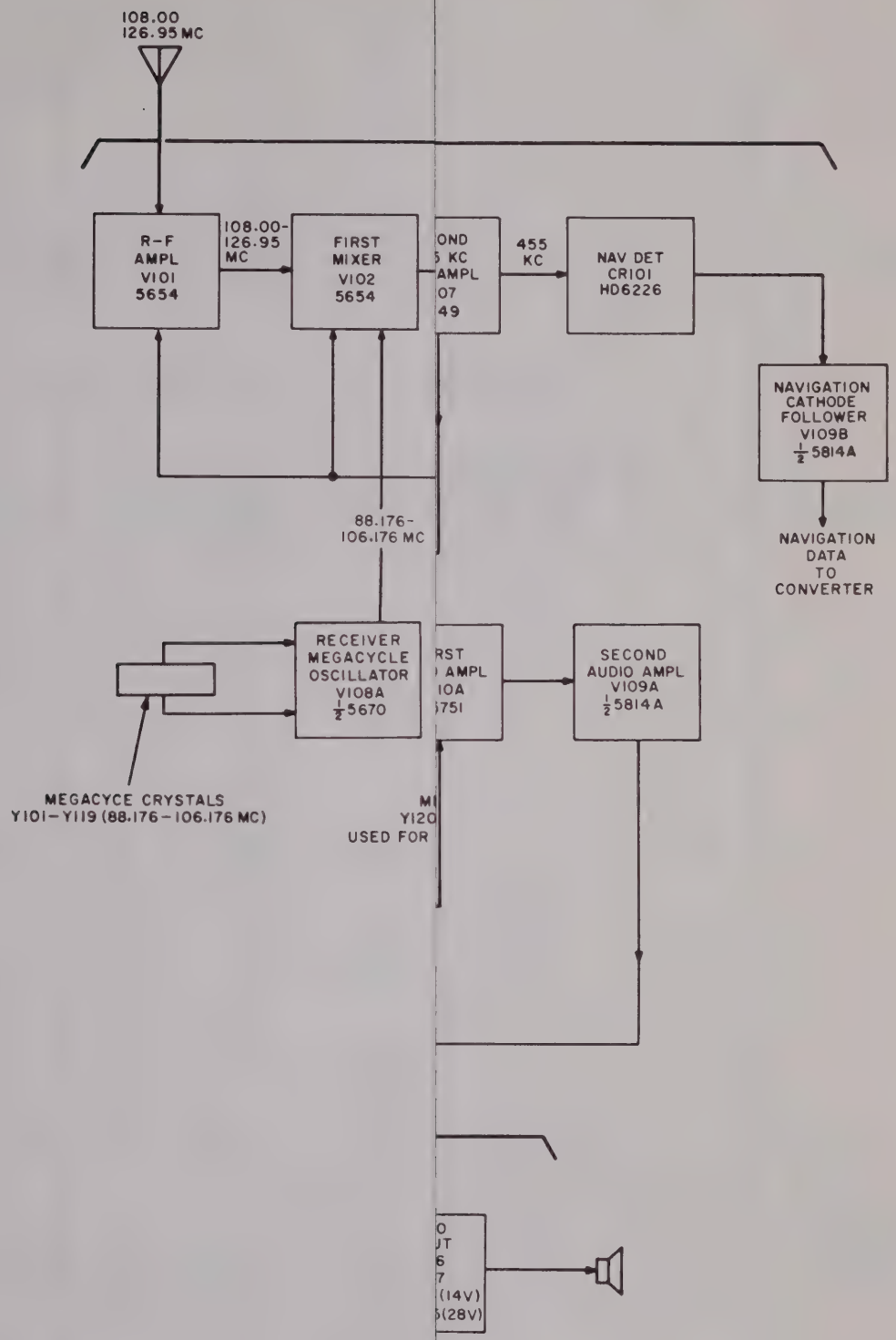
Fractional Megacycle Oscillator. The fractional megacycle oscillator, V108B, uses one half of a twin triode in a modified Pierce oscillator circuit. This circuit generates the fractional megacycle injection frequency for both the second mixer, V103A, and the transmitter balanced mixer, V204. The oscillator frequency may be controlled by either the receiver fractional megacycle channel selector switch or the transmitter fractional megacycle channel selector switch. When using the receiver (transmitter unkeyed), receive-transmit relay K101 will be unenergized and selection of the fractional megacycle oscillator frequency is controlled by the receiver fractional megacycle channel selector switch. When transmitting, K101 will be energized and selection of the fractional megacycle oscillator frequency is controlled by the transmitter fractional megacycle channel selector switch.

Depending on the receiver frequency or the transmitter frequency, any one of 20 quartz crystals (Y120 to Y139) may be switched into the grid circuit. Since the operating frequency of a Pierce oscillator is determined only by the resonant frequency of the crystal in its grid circuit, the fractional megacycle oscillator may operate at any frequency between 21.824 and 22.774 mc without variable tuning elements. Regenerative feedback to sustain oscillation is coupled by C160 to the grid circuit. Oscillator excitation voltage is coupled to the grid of the receiver second mixer, V103A, by C159, and to the transmitter mixer, V204, by L108 and a coupling link on T201.

Second Mixer. The second mixer, V103A, uses one half of a twin triode. The output of the first i-f filter (19.824 to 20.774 mc) is fed to the grid while the injection frequency (21.824 to 22.774 mc) is coupled through C159. The first i-f signal beats with the injection frequency to produce the second i-f signal of 2.0 mc. The second i-f signal is coupled to T102. The tapped primary winding of T102 is used as a plate load. Coupling between the primary and secondary windings of T102 is by a combination of mutual inductance and the capacity of C123. The output of T102 is applied to the grid of V104.

2.0-mc I-f Amplifier. V104, the 2.0-mc amplifier, is a 5749 pentode used in a class A voltage amplifier. Agc voltage is applied to the grid via the low side of T102 and a decoupling circuit consisting of R115 and C124. The output of V104 is connected to T103. The transformer is tuned to pass the difference frequency (2.0 mc) and attenuate all other frequencies. Coupling between the primary and secondary winding of T103 is by a combination of mutual inductance and the capacity of C128. The output of T103 is coupled to the grid of V105.

Converter. V105 is a 5750 used in a Pierce oscillator-mixer circuit. The oscillator uses the cathode and grids No. 1, 2, and 4. Grids No. 2 and 4 act as a plate and are held at r-f ground potential. Quartz crystal Y140, which is connected between the grid and plate of the oscillator, governs the oscillator frequency at 1545 kc. Grid No. 5 of V105 is connected to the cathode and acts as an additional shield between the plate circuit and the signal and oscillator grids. The 2.0-mc i-f signal from T103 is connected to grid No. 3 (pin 7). This in-



-3. Communication and Navigation Receiver, Block Diagram

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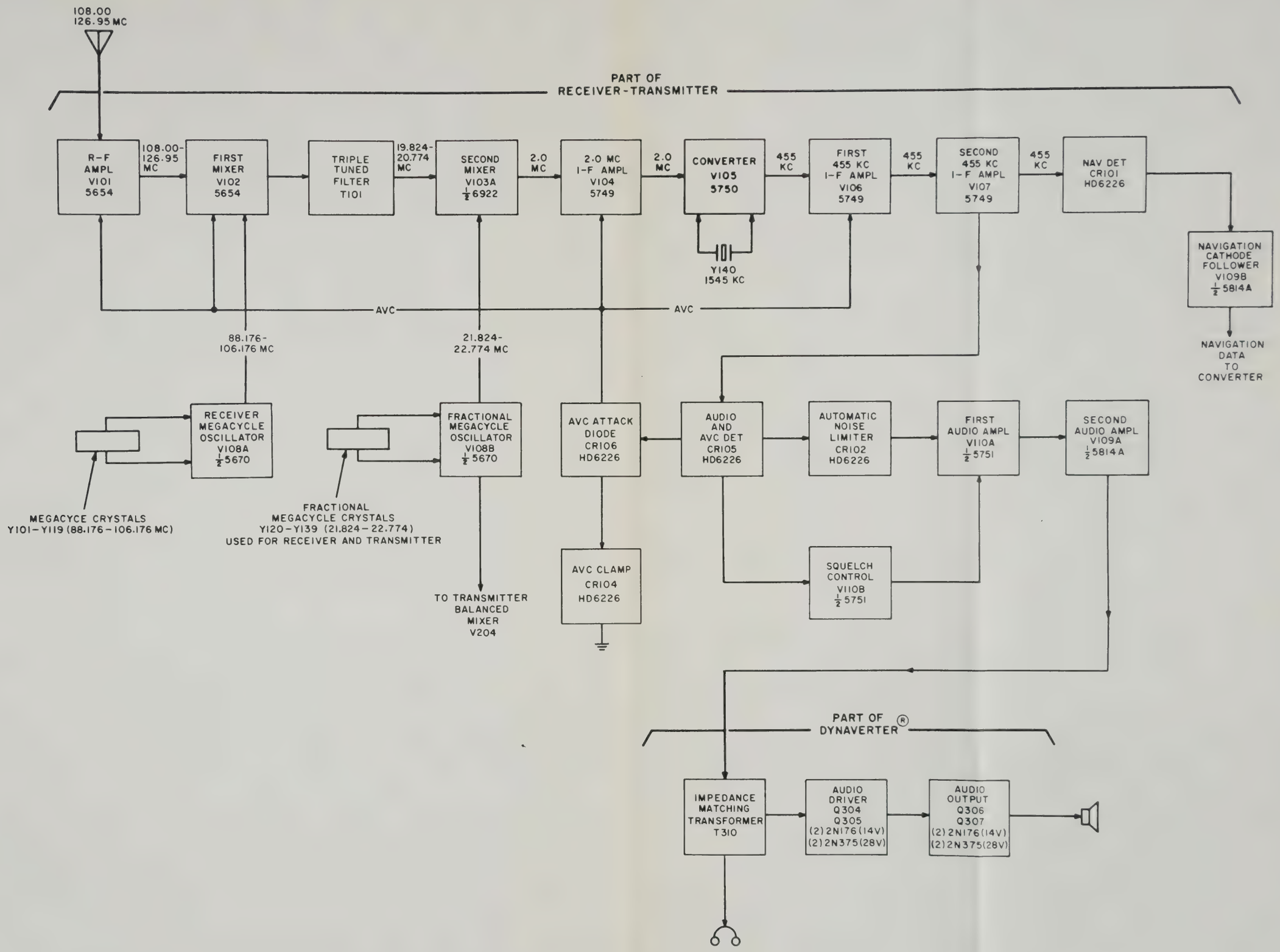
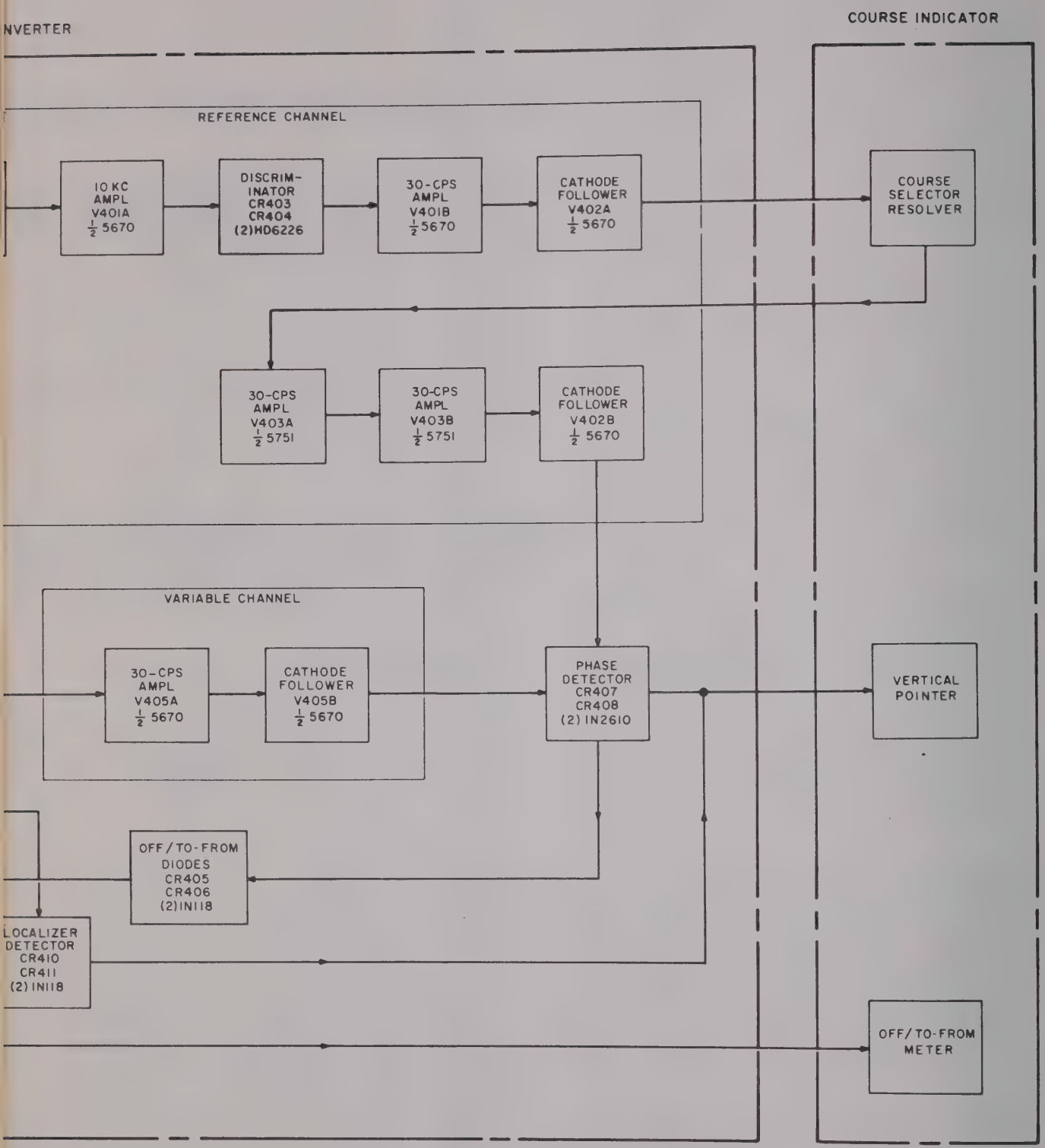

108.00
126.95 MC
PART OF
RECEIVER-TRANSMITTER
R-F AMPL V101 5654
108.00-126.95 MC
FIRST MIXER V102 5654
TRIPLE TUNED FILTER T101
19.824-20.774 MC
SECOND MIXER V103A ½6922
2.0 MC
2.0 MC I-F AMPL V104 5749
2.0 MC
CONVERTER V105 5750
Y140 1545 KC
455 KC
FIRST 455 KC I-F AMPL V106 5749
455 KC
SECOND 455 KC I-F AMPL V107 5749
455 KC
NAV DET CR101 HD6226
NAVIGATION CATHODE FOLLOWER V109B ½5814A
NAVIGATION DATA TO CONVERTER
AVC
AVC
88.176-106.176 MC
21.824-22.774 MC
RECEIVER MEGACYCLE OSCILLATOR V108A ½5670
FRACTIONAL MEGACYCLE OSCILLATOR V108B ½5670
AVC ATTACK DIODE CR106 HD6226
AUDIO AND AVC DET CR105 HD6226
AUTOMATIC NOISE LIMITER CR102 HD6226
FIRST AUDIO AMPL V110A ½5751
SECOND AUDIO AMPL V109A ½5814A
MEGACYCE CRYSTALS Y101-Y119 (88.176-106.176 MC)
FRACTIONAL MEGACYCLE CRYSTALS Y120-Y139 (21.824-22.774) USED FOR RECEIVER AND TRANSMITTER
TO TRANSMITTER BALANCED MIXER V204
AVC CLAMP CR104 HD6226
SQUELCH CONTROL V110B ½5751
PART OF DYNAVERTER®
IMPEDANCE MATCHING TRANSFORMER T310
AUDIO DRIVER Q304 Q305 (2) 2N176 (14V) (2) 2N375 (28V)
AUDIO OUTPUT Q306 Q307 (2) 2N176 (14V) (2) 2N375 (28V)

Figure 2-3. Communication and Navigation Receiver, Block Diagram


NVERTER
COURSE INDICATOR
REFERENCE CHANNEL
10 KC AMPL V401A ½ 5670
DISCRIM-INATOR CR403 CR404 (2)HD6226
30-CPS AMPL V401B ½ 5670
CATHODE FOLLOWER V402A ½ 5670
COURSE SELECTOR RESOLVER
30-CPS AMPL V403A ½ 5751
30-CPS AMPL V403B ½ 5751
CATHODE FOLLOWER V402B ½ 5670
VARIABLE CHANNEL
30-CPS AMPL V405A ½ 5670
CATHODE FOLLOWER V405B ½ 5670
PHASE DETECTOR CR407 CR408 (2) IN2610
VERTICAL POINTER
OFF/TO-FROM DIODES CR405 CR406 (2)IN118
LOCALIZER DETECTOR CR410 CR411 (2) IN118
OFF/TO-FROM METER

coming signal modulates the electron stream within the tube to produce the desired mixing action. The 455-kc output from V105 is coupled to T104. T104 is tuned to pass 455-kc and attenuate all other frequencies. The transformer output is fed to the grid of V106.

455-kc I-f Amplifiers. V106 and V107 are used in a two-stage, i-f amplifier circuit. The 455-kc output signal from V105 is coupled through T104 to the grid of V106. Agc voltage is also connected to the grid through the secondard winding of T104. Decoupling is provided by R126 and C137. Resistor R129 is used to set the i-f sensitivity.

The amplified 455-kc output from V106 is impressed across the primary winding of T105. The secondary output is connected to the grid of V107. The output of V107 is impressed across T106.

Navigation Detector and Navigation Cathode Follower. The 455-kc output from T106 is connected to the navigation detector, CR101. Capacitor C149 bypasses CR101 to ground. One end of the secondary of T106 is connected to ground through C147 and R135 and R173. The value of R173, which is selected at final factory adjustment, determines the phase shift between the 30- and 9960-cps signals. The 30-cps — 9960-cps combination is applied to the grid of V109B from the junction of diode load resistors R136 and R137. C176 with R136 is used to prevent the 455-kc i-f signal from appearing on the grid of V109B.

V109B is a cathode follower which provides a low-impedance source for the navigation signal to the converter. This stage isolates navigation detector CR101 from the converter to minimize phase shift due to variations in the effective load. The cathode signal (navigation signal) is applied to the converter through pin 3 of P101. The grid of V109B is connected through choke L111 to flag switch S101C. The flag switch is oriented so that when the receiver fractional megacycle switch is set to an "0.05 position," low-voltage dc is connected through the switch contacts and L111 to the grid of V109B. Application of low-voltage dc to the grid effectively reverse-biases the navigation detector and prevents the receiver from putting out any signal on the navigation line on 0.05-mc positions of the fractional megacycle switch.

Audio Detector and AVC Diode. The r-f signal from the secondary winding of T106 is coupled through C175 to CR105. The cathode end of CR105 is connected to ground so that the d-c voltage level across the diode load resistors, R166, R167, and R168, will increase in a negative direction as the r-f input is increased.

This negative voltage is delayed from causing agc action until a predetermined signal level is reached by positive-biasing resistors R164 and R172. When the voltage at the junction of R165 and R166 exceeds the positive bias, which would appear on the agc line with CR104 disconnected, the agc line begins to go negative. The negative potential on the agc line increases with increasing signal. CR104 clamps the agc line to approximately 0.5 volt positive to prevent excessive positive biasing of the agc control grids. R163, R165, C172 and C173 provide a filter to prevent demodulated 30-cycle signals from appearing on the agc control grids. Any appreciable level of 30 cycles on the agc line will cause phase shift in the variable 30-cycle modulation and contribute course error. When CR106 conducts, R163 is shorted out, reducing the agc time constant on sudden application of r-f signals to the receiver. CR106 conducts any time the cathode is more negative than the anode, such as when a sudden change of input signal makes the negative detector voltage across C173 greater than across C172.

Automatic Noise Limiter. The detected audio output voltage taken from across R168 is applied to the anode of automatic noise limiter CR102. The audio voltage on the cathode of CR102 is filtered by C170 and further decoupled by R159 and C185. The audio voltage across C185 is coupled through C169 to the top of the volume control potentiometer R158. Capacitor C197 provides high-frequency roll-off. The bias for CR102 is obtained by adding the voltage across R166 and R167. This voltage is applied to the cathode of CR102 through R162, timing capacitor C171, R160, and R159, Capacitor C171 prevents the cathode end of CR102 from going negative except on pulses of very long duration. Since there is no delay to pulses applied to the anode end of CR102, a short pulse will bias the diode beyond cutoff and prevent the pulses from entering the audio line.

First Audio Amplifier. The first audio amplifier uses one half of a 5751, V110A, in a conventional voltage amplifier circuit. The audio signal from the arm of R158 is coupled through C168 to the grid of V110A. Conduction of V110A is controlled by the squelch control tube, V110B. Plate decoupling for the stage is accomplished by R147 with C165 providing audio decoupling. Cathode bias is applied from the 104-volt regulated line and through R149.

Squelch Control. The squelch control tube, V110B, is one half of a 5751. Squelching is accomplished by varying the bias voltage on V110A to cut the tube off in the absence of a carrier. The plate of V110B is connected through R152 to the grid of V110A. R150, R153, and R154A form a voltage divider between the 104-volt regulated line and ground. With no signal input, R155, R156, and R157, which are connected between the 104-volt regulated line and the grid of V110B, maintain a positive voltage on the grid of V110B. With R154A fully counterclockwise, the full resistance of the potentiometer is connected in the circuit, making the cathode of V110B negative with respect to the grid. Under this condition, V110B will conduct heavily and V110A will cut off because of the negative grid voltage.

When an input signal of sufficient magnitude is received, a negative voltage proportional to the signal magnitude is connected through R161 to the grid of V110B. If the signal is strong enough, the negative voltage will neutralize the positive voltage on the grid of V110B and reduce the conduction of V110B. With reduced current flow through V110B, the d-c

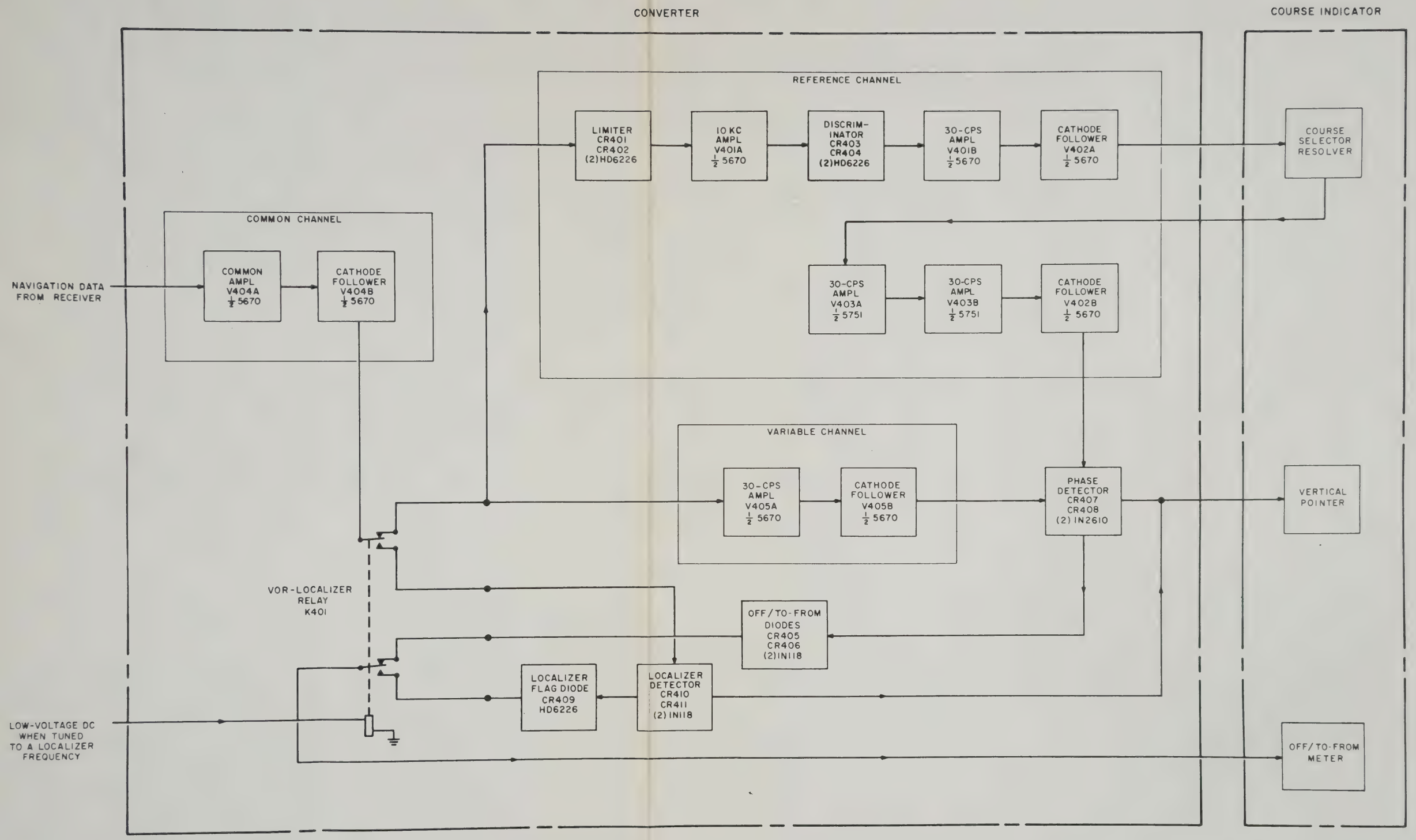

CONVERTER
COURSE INDICATOR
REFERENCE CHANNEL
LIMITER CR401 CR402 (2)HD6226
10 KC AMPL V401A ½ 5670
DISCRIM-INATOR CR403 CR404 (2)HD6226
30-CPS AMPL V401B ½ 5670
CATHODE FOLLOWER V402A ½ 5670
COURSE SELECTOR RESOLVER
COMMON CHANNEL
COMMON AMPL V404A ½ 5670
CATHODE FOLLOWER V404B ½ 5670
NAVIGATION DATA FROM RECEIVER
30-CPS AMPL V403A ½ 5751
30-CPS AMPL V403B ½ 5751
CATHODE FOLLOWER V402B ½ 5670
VARIABLE CHANNEL
30-CPS AMPL V405A ½ 5670
CATHODE FOLLOWER V405B ½ 5670
PHASE DETECTOR CR407 CR408 (2) IN2610
VERTICAL POINTER
VOR-LOCALIZER RELAY K401
OFF/TO-FROM DIODES CR405 CR406 (2)IN118
LOCALIZER FLAG DIODE CR409 HD6226
LOCALIZER DETECTOR CR410 CR411 (2) IN118
LOW-VOLTAGE DC WHEN TUNED TO A LOCALIZER FREQUENCY
OFF/TO-FROM METER

Figure 2-4. Navigation Data Flow Diagram

coming signal modulates the electron stream within the tube to produce the desired mixing action. The 455-kc output from V105 is coupled to T104. T104 is tuned to pass 455-kc and attenuate all other frequencies. The transformer output is fed to the grid of V106.

455-kc I-f Amplifiers. V106 and V107 are used in a two-stage, i-f amplifier circuit. The 455-kc output signal from V105 is coupled through T104 to the grid of V106. Agc voltage is also connected to the grid through the secondard winding of T104. Decoupling is provided by R126 and C137. Resistor R129 is used to set the i-f sensitivity.

The amplified 455-kc output from V106 is impressed across the primary winding of T105. The secondary output is connected to the grid of V107. The output of V107 is impressed across T106.

Navigation Detector and Navigation Cathode Follower. The 455-kc output from T106 is connected to the navigation detector, CR101. Capacitor C149 bypasses CR101 to ground. One end of the secondary of T106 is connected to ground through C147 and R135 and R173. The value of R173, which is selected at final factory adjustment, determines the phase shift between the 30- and 9960-cps signals. The 30-cps -- 9960-cps combination is applied to the grid of V109B from the junction of diode load resistors R136 and R137. C176 with R136 is used to prevent the 455-kc i-f signal from appearing on the grid of V109B.

V109B is a cathode follower which provides a low-impedance source for the navigation signal to the converter. This stage isolates navigation detector CR101 from the converter to minimize phase shift due to variations in the effective load. The cathode signal (navigation signal) is applied to the converter through pin 3 of P101. The grid of V109B is connected through choke L111 to flag switch S101C. The flag switch is oriented so that when the receiver fractional megacycle switch is set to an "0.05 position," low-voltage dc is connected through the switch contacts and L111 to the grid of V109B. Application of low-voltage dc to the grid effectively reverse-biases the navigation detector and prevents the receiver from putting out any signal on the navigation line on 0.05-mc positions of the fractional megacycle switch.

Audio Detector and AVC Diode. The r-f signal from the secondary winding of T106 is coupled through C175 to CR105. The cathode end of CR105 is connected to ground so that the d-c voltage level across the diode load resistors, R166, R167, and R168, will increase in a negative direction as the r-f input is increased.

This negative voltage is delayed from causing agc action until a predetermined signal level is reached by positive-biasing resistors R164 and R172. When the voltage at the junction of R165 and R166 exceeds the positive bias, which would appear on the agc line with CR104 disconnected, the agc line begins to go negative. The negative potential on the agc line increases with increasing signal. CR104 clamps the agc line to approximately 0.5 volt positive to prevent excessive positive biasing of the agc control grids. R163, R165, C172 and C173 provide a filter to prevent demodulated 30-cycle signals from appearing on the agc control grids. Any appreciable level of 30 cycles on the agc line will cause phase shift in the variable 30-cycle modulation and contribute course error. When CR106 conducts, R163 is shorted out, reducing the agc time constant on sudden application of r-f signals to the receiver. CR106 conducts any time the cathode is more negative than the anode, such as when a sudden change of input signal makes the negative detector voltage across C173 greater than across C172.

Automatic Noise Limiter. The detected audio output voltage taken from across R168 is applied to the anode of automatic noise limiter CR102. The audio voltage on the cathode of CR102 is filtered by C170 and further decoupled by R159 and C185. The audio voltage across C185 is coupled through C169 to the top of the volume control potentiometer R158. Capacitor C197 provides high-frequency roll-off. The bias for CR102 is obtained by adding the voltage across R166 and R167. This voltage is applied to the cathode of CR102 through R162, timing capacitor C171, R160, and R159, Capacitor C171 prevents the cathode end of CR102 from going negative except on pulses of very long duration. Since there is no delay to pulses applied to the anode end of CR102, a short pulse will bias the diode beyond cutoff and prevent the pulses from entering the audio line.

First Audio Amplifier. The first audio amplifier uses one half of a 5751, V110A, in a conventional voltage amplifier circuit. The audio signal from the arm of R158 is coupled through C168 to the grid of V110A. Conduction of V110A is controlled by the squelch control tube, V110B. Plate decoupling for the stage is accomplished by R147 with C165 providing audio decoupling. Cathode bias is applied from the 104-volt regulated line and through R149.

Squelch Control. The squelch control tube, V110B, is one half of a 5751. Squelching is accomplished by varying the bias voltage on V110A to cut the tube off in the absence of a carrier. The plate of V110B is connected through R152 to the grid of V110A. R150, R153, and R154A form a voltage divider between the 104-volt regulated line and ground. With no signal input, R155, R156, and R157, which are connected between the 104-volt regulated line and the grid of V110B, maintain a positive voltage on the grid of V110B. With R154A fully counterclockwise, the full resistance of the potentiometer is connected in the circuit, making the cathode of V110B negative with respect to the grid. Under this condition, V110B will conduct heavily and V110A will cut off because of the negative grid voltage.

When an input signal of sufficient magnitude is received, a negative voltage proportional to the signal magnitude is connected through R161 to the grid of V110B. If the signal is strong enough, the negative voltage will neutralize the positive voltage on the grid of V110B and reduce the conduction of V110B. With reduced current flow through V110B, the d-c

potential on the plate will rise, causing the grid of V110A to go more positive. With a positive grid, V110A will conduct and amplify the detected audio. R157, the squelch limiter, is selected at final factory adjustment. C167, which is connected between the grid of V110B and ground, eliminates bursts of audio and short duration pulses from affecting the squelch.

Audio Output. The audio output from V110A is coupled through C162 to the grid of V109A. The amplified audio output is connected from the output transformer, T310, through pin 7 of P101.

If the optional marker beacon receiver is used, marker audio from the dynaverter is connected through pin 8 of P101 and the MKR audio volume control, R154B, to the grid of V109A.

The audio output stages contained in the dynaverter are discussed in the dynaverter description.

Transmitter. The transmitter portion provides a four-watt amplitude-modulated output on any of the 360 allocated channels. As shown in Figure 2-5, four and one half tubes and five transistors are employed in the transmitter circuit. Tuning is controlled by the fractional megacycle and whole megacycle switches. A gear train provides the mechanical linkage between the two switches and their respective crystal drums. Five variable inductors, controlled by a shaft which is linked to the transmitter megacycle channel selector switch, are also used to tune the transmitter.

Transmitter Megacycle Oscillator. The transmitter megacycle oscillator uses one-half of a 6922, V103B, in a grounded-grid, series-mode, crystal oscillator circuit. This stage generates the megacycle r-f injection signal for the balanced mixer, V204. Depending on the setting of the transmitter megacycle channel selector, one of 18 crystals is connected in the cathode circuit of V103B. The plate tank circuit consisting of C241, C242, C250, and L215 is tuned by L216 to resonate at the frequency of the selected crystal. Regenerative feedback is coupled from the junction of C241 and C250 to the selected crystal. Z202 neutralizes the crystal capacitance to prevent free running of the oscillator. The output signal is coupled through C240 to V204.

Balanced Mixer. A 6922 twin triode, V204, is used as the balanced mixer. The r-f signal voltage from V103B (96, 176-113.176 mc) is coupled through C238 and C239 to the grids of V204. The grid signals from the megacycle oscillator are therefore in phase with each other at the mixer grids. The output (21.824-22.774 mc) from the fractional megacycle oscillator, V108B, is fed through L108 to the primary of T201. The ends of the secondary of T201 are connected individually to the mixer grids. The fractional megacycle grid signals are therefore out of phase with each other. The resulting push-pull action of the stage attenuates even harmonics of the fractional megacycle oscillator and eliminates spurious signals. The plate tank circuit consisting of C231, C232, C233, and L213 is tuned by L214. This circuit

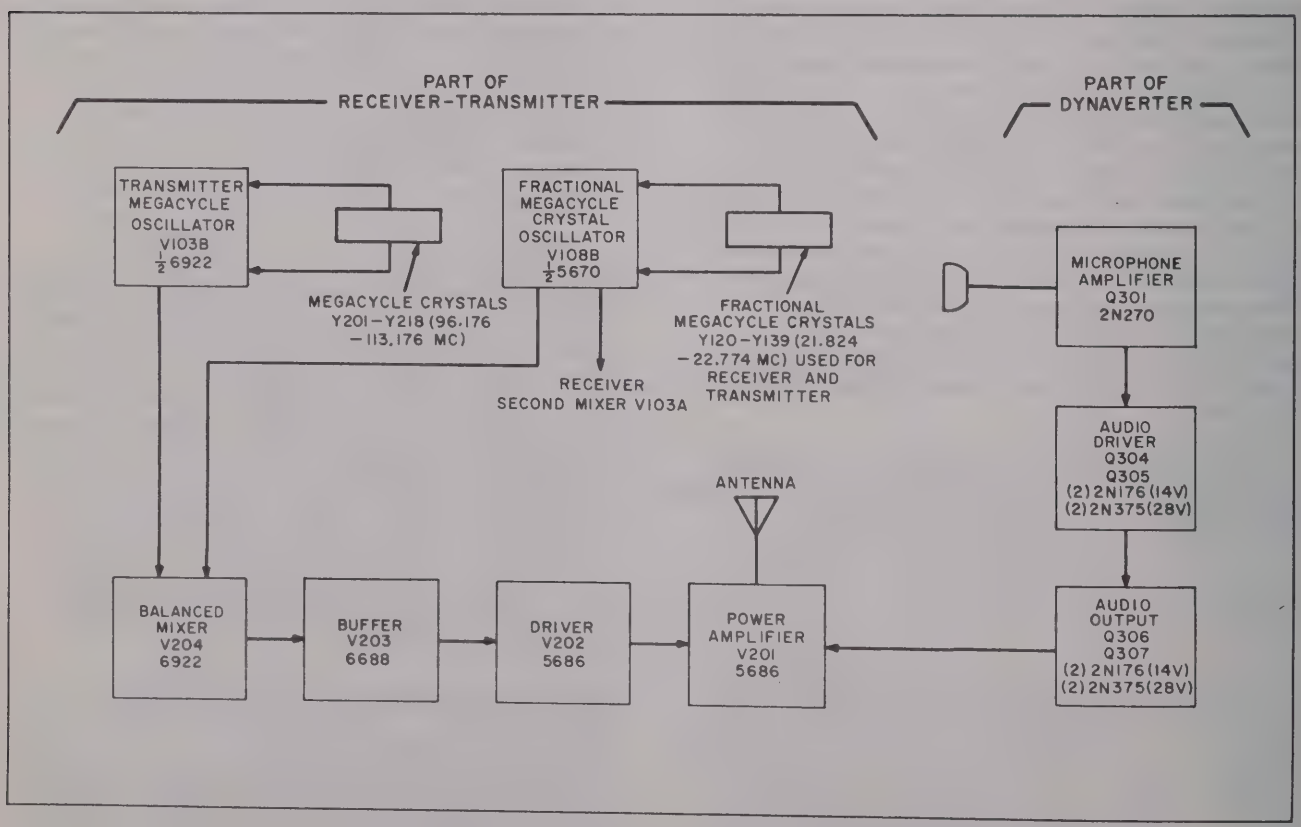

PART OF
RECEIVER-TRANSMITTER
PART OF
DYNAVERTER
TRANSMITTER MEGACYCLE OSCILLATOR V103B ½6922
FRACTIONAL MEGACYCLE CRYSTAL OSCILLATOR V108B ½5670
MEGACYCLE CRYSTALS Y201-Y218 (96.176 -113.176 MC)
FRACTIONAL MEGACYCLE CRYSTALS Y120-Y139 (21.824 -22.774 MC) USED FOR RECEIVER AND TRANSMITTER
RECEIVER SECOND MIXER V103A
MICROPHONE AMPLIFIER Q301 2N270
AUDIO DRIVER Q304 Q305 (2) 2N176 (14V) (2) 2N375 (28V)
ANTENNA
BALANCED MIXER V204 6922
BUFFER V203 6688
DRIVER V202 5686
POWER AMPLIFIER V201 5686
AUDIO OUTPUT Q306 Q307 (2) 2N176 (14V) (2) 2N375 (28V)

Figure 2-5. VHF Transmitter, Block Diagram

is inductively tuned to resonate to the sum frequency of both input signals (118.00-135.95 mc). To accomplish the mixing, capacitors C234 and C235 are used for d-c blocking. The mixer output is coupled through C230 to the grid of V203.

Buffer. V203, a 6688 pentode, isolates V204 from V202. The r-f input (118.00 to 135.95 mc) from the mixer is coupled through C230 to the grid of V203. The output, taken from the plate, is coupled through C222 to the grid of V202. The plate tank circuit consisting of C225 and L210 is tuned by L211 to the transmitter output frequency.

Driver. A 5686 pentode, V202, is used for the r-f driver-amplifier. The amplified signal is connected from the plate to a tank circuit consisting of C215 and L206; the plate tank is inductively tuned by L207.

Receive-transmit relay K101, which is a current-sensitive device, is used to switch the fractional megacycle crystals from the receiver to the transmitter depending on which function is selected. The relay solenoid is connected in series with the plate supply circuit of V202. When V202 conducts, current will flow through the relay solenoid and energize the relay.

Power Amplifier. The final power amplifier, V201, is a 5686 pentode in a conventional class C power amplifier circuit. The output from V202 is coupled through C212 to the grid of V201. The amplified output of V201 is connected to a tank circuit consisting of C201, C202, C205, and L202; the plate tank circuit is inductively tuned by L203. The r-f signal (118.00 to 135.95 mc) is coupled to harmonic filter Z201 through C203. The output of Z201 is connected through J201 to the transmitting antenna.

Operation of the transmitter circuits contained in the dynaverter are discussed under Modulator Function in the dynaverter description.

CONVERTER.

General. The converter receives VOR information from the receiver-transmitter. The converter is designed to convert and interpret the information in such a way that the bearing of the receiving antenna from the transmitting antenna may be determined. The converter is also designed to accept the localizer information from the receiver and convert it to a form that is presented visually through the pointer of the indicator.

The converter consists of three major circuits: A VOR circuit, a localizer circuit, and a vertical pointer and flag circuit. The VOR circuit consists of a common channel, a reference-phase channel, and a variable-phase channel. The localizer circuit consists of a common amplifier, a 90-cps filter, and a 150-cps filter. The vertical pointer and flag circuit is used for both VOR and localizer. However, modification of the circuit does take place for each mode of operation.

VOR Circuit. The VOR navigational signal from the panel unit consists of two independent signals. One is 30 cps and is known as the variable channel signal. Its phase at any given instant is a function of the aircraft's bearing from the transmitter. The other signal is 9960 cps and is known as the reference channel signal. This signal is frequency-modulated at a 30-cps rate to 480 cps above and below 9960 cps. The phase of the reference channel is independent of the bearing from the transmitter. Omnidirectional range transmission is such that for a signal received directly north (magnetic) of the VOR station, the 30-cps variable channel amplitude modulation is in phase with the 30-cps frequency modulation of the 9960-kc channel. When this signal is received, the data presented by the indicator will be 0° FROM or 180° TO the station. (All bearings are magnetic in VOR.) At all points around the transmitter, the two 30-cps voltages differ in phase by an amount equal to the receiving antenna's bearing from the transmitter. The function of the VOR section of the converter, with the aid of the bearing indicator, is to measure this phase difference, which is then presented on the bearing indicator as a bearing TO or FROM the VOR station.

The 9960-kc FM signal is applied to the reference channel and the 30-cps AM signal is applied to the variable channel. The phase detector, comprising CR407 and CR408, and the bearing indicator determine if the two 30-cps signals are 90 degrees apart in phase and which phase is leading. The course selector portion of the bearing indicator and its associated circuits can be used to shift the phase of the reference channel signal as desired until the vertical pointer indicates that the two phases are 90 degrees apart. When this condition exists, the vertical pointer is centered.

Common Channel. Navigation data from the receiver-transmitter is applied to a bandpass network comprising R440, R441, R442, C416, C417, C418, and C419. When the Nav/Com is tuned to a VOR frequency, the junction of R440 and C419 is grounded through a set of normally closed contacts of VOR/localizer relay K401. With one end of C418 grounded, the network attenuates all frequencies except those near 30 cps and 9960 cps. When tuned to a localizer frequency, ground is disconnected from the junction of R440 and C419. The network then provides a bandpass for only the 90- and 150-cps signals and effectively attenuates all other frequencies. Additional high frequency attenuation is provided by C428.

The output of the bandpass network is coupled to the grid of the first stage of a two-stage voltage amplifier circuit. V404A is one half of a 5670 twin triode used in a class A voltage amplifier circuit. The output from V404A is coupled through C420 to the grid of V404B. V404B is a cathode follower. The output from V404B is coupled through C421 to a movable contact on K401.

Reference Channel. When the Nav/Com is tuned to a VOR frequency, the 30- and 9960-cps signals from the common channel are connected through a pair of normally closed contacts on K401 to a 10-kc

high-pass filter consisting of C401 and R401. The 9960-kc FM signal is connected to a double-diode limiter, CR401 and CR402. The limiter removes any AM which may be present on the 9960-kc FM signal. The signal, which has been reduced to approximately one-third of its original amplitude, is amplified by V401A.

The output of V401A, which consists of the 9960-kc FM signal modulated at 30 cps, is connected from the plate of V401A to a Foster-Seely type frequency discriminator. The frequency discriminator (FM detector) extracts the 30-cps modulation from the 9960-kc FM signal and couples the resulting signal to the 30-cps amplifier, V401B. The resulting amplified signal is coupled through cathode follower V402A, pin 8 of J401, and pin J of J401 to the resolver rotor in the bearing indicator. The cathode follower matches the high output impedance of the 30-cps amplifier to the low impedance of the course selector, With the unbypassed rotor in series with the cathode of V402A, the cathode follower current flow produces a 30-cps alternating magnetic field around the rotor, which in turn induces a voltage in the stator windings.

The two stator windings of the course selector are mechanically displaced by 90°. The voltage induced in each winding is proportional to the angle of coupling between the rotor and each stator winding. The voltage applied to the grid of V403A is a composite of the voltage output of stator No. 2, shifted in phase by "lag" network R419, R420, and C409, and of the voltage output of stator No. 1, shifted in phase by "lead" network C409, R419, and R420. The output of the phase-shifting network varies in phase with the amplitudes of the stator voltages. Since the position of the rotor determines the amplitudes of the stator voltages, and since the position of the rotor is manually controlled by the operator, the operator has direct control over the phase of the reference signal. The 30-cps output of the phase-shifting network is applied to a two-stage amplifier, V403A and V403B. The amplified output of V403B is applied through cathode follower V402B to the phase detector.

Variable Channel. When the Nav/Com is tuned to a VOR frequency, the 30-cps signal from the common channel is connected through a pair of normally closed contacts on K401 and a phase-shifting network to the grid of V405A. The output of V405A is coupled by V405B to the phase detector.

Phase Detector. The reference channel output and the variable channel output are connected to the phase detector. These two signals have a 90-degree phase relationship when the aircraft is on the selected radial. During VOR operation, the vertical pointer circuit forms a part of the phase detector. Under this condition, the voltages applied to the pointer of the course indicator are equal, no current flows through the vertical pointer meter, and the pointer is centered. If the phase relationship of the reference-phase and variable-phase signals is changed, either by the pilot changing the position of the course selector rotor or by a change in the bearing of the aircraft, the voltages applied to the vertical pointer meter are unbalanced, a current flows through the meter, and the pointer moves either left or right, depending on the polarity of the unbalanced voltages. The extent of pointer movement depends on the extent of change in the course selector setting or the bearing of the aircraft.

R438 is used to select the point of electrical balance between CR407 and CR408.

Localizer Circuit. The runway localizer information supplied to the converter by the panel unit consists of the 90- and 150-cps AM component of the transmitted localizer signal. When the aircraft is on the runway centerline, the modulation signals are of equal strength. On either side of the runway centerline one signal is stronger than the other. When tuned to a runway localizer frequency, the panel unit amplifier the selected r-f signal, separates the 90-and 150-cps AM component from the r-f carrier, and applies them to the converter navigation circuits. Selection of a runway localizer frequency also energizes K401. With K401 energized, the common channel is modified to provide for operation on the localizer frequencies.

The output from the two-stage common amplifier, which consists of the 90- and 150-cps modulations, is connected through a pair of normally open contacts on K401 to two tuned tank circuits. One tank circuit, consisting of C425 and the 3.12-henry portion of L401, is tuned to 90 cps. The other tank circuit, consisting of C426 and the 1.75-henry portion of L401, is tuned to 150 cps. If the aircraft is on the localizer, the tank circuit outputs will be equal, resulting in equal outputs from CR410 and CR411. With equal current outputs, no current will flow through the series-connected vertical pointer circuit and the pointer will remain centered. If the aircraft is not directly on the localizer, more current will flow in one tank circuit than the other, resulting in current flow through the vertical pointer circuit and a corresponding deflection of the vertical pointer. R465 balances the 90-cps and 150-cps circuits for equal current flow when the aircraft is on the localizer. CR409 rectifies a portion of the 90- and 150-cps signal which is connected to the TO-FROM/flag circuit.

OFF/TO-FROM Circuit. The OFF/TO-FROM flag meter of the course indicator performs a dual function. It operates as a conventional TO-FROM indicator and as a flag to indicate the presence or absence of usable output signals from the converter during VOR and localizer operation.

When the panel unit is tuned to a VOR station, the to-from detector, CR405 and CR406, is connected through a pair of normally closed contacts on relay K401 to the OFF/TO-FROM flag meter of the indicator. The to-from detector resolves the ambiguity inherent in the course indications of the vertical pointer. Normally, a 90-degree phase relationship exists between the reference-phase and variable-phase signals. This condition centers the course indicator vertical pointer when the aircraft is flying

to a station on a selected radial or when an aircraft is flying from a station on the reciprocal of a selected radial. The only difference produced by the two flight conditions is that the variable-phase signal lags the reference-phase voltage while flying to the station and leads the reference-phase voltage while flying away from the station. Since the course indicator cannot distinguish between the two 90-degree phase relationships, an additional phase shift is introduced in the flag circuit so that the two signals are either in phase or 180 degrees out of phase. The detector circuit develops a d-c voltage which produces a FROM indication when the input signals are in phase and a TO indication when the input signals are 180 degrees out of phase.

When the panel unit is tuned to a localizer frequency, the localizer flag diode, CR409, is connected in series with the OFF/TO-FROM indicator through a pair of normally open contacts on K401. CR409 rectifies a small portion of the localizer signal. The resultant d-c voltage is connected to the OFF/TO-FROM flag meter which is oriented so that with a usable localizer signal the meter will indicate TO. When the received localizer signal is weak, insufficient current will flow through the OFF/TO-FROM flag meter coil and the meter will indicate OFF.

DYNAVERTER.

General. The dynaverter performs six functions for the Nav/Com. The functions are as follows:

a. When the Nav/Com is used as a communications receiver, T310 of the dynaverter is used as the output transformer for phone operation.

b. The output of T310 may be connected to a two-stage audio amplifier consisting of push-pull driver Q304 and Q305 and push-pull power amplifier Q306 and Q307. The output of the power amplifier may be used to drive a cabin speaker.

c. The two-stage audio amplifier may be used as an independent audio amplifier to provide amplified audio from the optional marker beacon receiver or other associated equipment. Unterminated pins on J301 allow connecting up to five auxiliary inputs.

d. When the transmitter is used, Q301 is used as a microphone amplifier and the push-pull driver, Q304 and Q305, and the push pull power amplifier, Q306 and Q307, function as a modulator.

e. The multivibrator, Q302 and Q303, and the bridge rectifier, CR301, CR302, CR303, and CR304, are used as a high-voltage dc-dc power supply for the receiver and the transmitter circuits. The power supply furnishes the +280-volt, +140-volt, and +104-volt requirements.

f. When the marker beacon receiver is included, signals for aural and three-light visual indications of 75-mc marker beacon signals are provided.

Audio Amplifier. When the Nav/Com is used as a communications receiver, audio output signals from the plate of V109A in the panel unit are connected through L119, pin 7 of P101, and pin 7 of J301 to the primary winding of T310. The secondary winding of T310 is connected through pin 18 of J301 to the headset. If additional audio is desired for powering a cabin speaker, the output from pin 18 of J301 may be jumped back into the audio amplifier through pin 9, 13, 14, 15, or 16 of J301. Pins 9, 13, and 15 use a 1000-ohm resistor in series with the load and pins 14 and 16 use a 330-ohm resistor. The audio output is normally connected to the audio amplifier through pin 14 or 16. As desired, low-level audio from up to four sources other than the Nav/Com may be connected to the auxiliary inputs. All audio is connected through R343 and a pair of normally closed contacts on K301 to the primary winding of T301. The secondary winding of T301 is connected between the bases of push-pull driver Q304 and Q305. R313, which provides a series ground return for the collectors of Q304 and Q305, clips high audio spikes. Temperature sensitive resistor RT301 decreases in resistance with an increase in temperature. The decrease in resistance reduces the forward bias and thereby helps maintain a constant emitter current. Without temperature stabilization, the collector reverse current will increase with the temperature, causing a corresponding increase first in the collector current and then in the junction temperature. Higher junction temperature will raise the collector reverse current. The resultant "thermal runaway" will damage the transistor.

The output from the push-pull driver is alternately applied between the center-tapped ends of T303. The output from T303 is connected between the bases of Q306 and Q307. The amplified audio output is connected from the secondary winding (pins 6 to 7) through pin 1 of J301 to the cabin speaker. R340 and R341 provide the base bias for Q306 and Q307. Resistor R316 is a current-limiting device used on 28-volt units only.

Modulator Function. When the transmitter is keyed, the low-voltage path from pin 17 of J301 through L301, the solenoid of K301, and pin 2 of J301, is completed, energizing K301. Microphone audio is then connected through pin 3 of J301 to the base of microphone amplifier Q301. Emitter current and the resultant gain of Q301 is controlled by R307. The push-pull driver and push-pull power amplifier amplify the audio as when the circuit is used as an audio amplifier. The amplified microphone audio is impressed across the primary winding of T304. One secondard winding, pins 4 and 5, is returned to +280 volts dc. Audio voltage impressed across the secondary winding modulates the +280-volt dc. This modulated signal is connected through a pair of normally open contacts on K301 and pin 12 of J301 to V201 in the panel unit. When the microphone is keyed and K301 energized, R317 is connected in series with the other secondary winding, pins 6 and 7. Depending on the setting of R317, a portion of the modulated audio is connected to the cabin speaker as sidetone.

Power Supply. Low-voltage dc from the aircraft supply is connected through pin 17 of J301 and L301 to Q302 and Q303. The transistors are connected in

a self-excited multivibrator switching circuit. This circuit furnishes reversing-polarity, square-wave pulses to the primary of a toroidal transformer, T302. The secondary winding of T302 furnishes a square-wave output which is connected to a full-wave bridge rectifier consisting of four silicone diodes, CR301 - CR304. The bridge output, 280 volts dc, is filtered by C306A and then fed through chokes L302 and L306. The filtered output is fed through pin 10 of J301 to the receiver circuit.

In detail, the multivibrator circuit consisting of Q302 and Q303 performs the same function as the vibrator in a vibrator power supply; that is, the low-voltage dc is alternately applied across each half of the primary winding. To follow one square-wave cycle, assume that at the instant the circuit is energized a slight imbalance in Q302 and Q303 causes more current to flow in winding 3 - 4 than in winding 2 - 3 of T302. The flux in the transformer core begins to change toward saturation in one direction at a linear rate, since the product of the rate of change of flux with respect to time and the number of the turns must equal the battery voltage (disregarding the small back voltage due to the IR drop).

The change in flux induces voltages in windings 1 - 2 and 4 - 5, making them positive at pin 1 with respect to pin 2 and negative at pin 5 with respect to pin 4. The base of Q303, therefore, becomes negative with respect to its emitter, and the base of Q302 becomes positive with respect to its emitter. Under these conditions, Q303 is at saturation (low resistance from emitter to collector) and Q302 is cut off (high resistance from emitter to collector).

When Q303 is conducting heavily, almost all of the input voltage appears across winding 3 - 4 and the flux in the core of the transformer increases until saturation occurs. When the core becomes saturated, the flux ceases to change. Consequently, the induced voltages in windings 1 - 2 and 4 - 5 drop to zero, causing Q303 to cut off and the current in winding 3 - 4 to decrease.

The decrease of current in winding 3 - 4 causes a decrease of flux in the core of the transformer. This change of flux induces voltages of such polarity in windings 1 - 2 and 4 - 5 that they become negative at pin 1 with respect to pin 2 and positive at pin 5 with respect to pin 4. As a result, Q303 cuts off completely, Q302 conducts heavily, and current increases in winding 2 - 3 until saturation of the core occurs in the opposite direction. During this time, the voltages induced in windings 1 - 2 and 4 - 5 keep Q303 cut off and Q302 conducting. When the core of the transformer becomes saturated, the switching again takes place.

The switching action of the transistors continues to repeat. Current flows alternately in windings 2 - 3 and 3 - 4, inducing a square-wave alternating voltage in the secondary winding of the transformer.

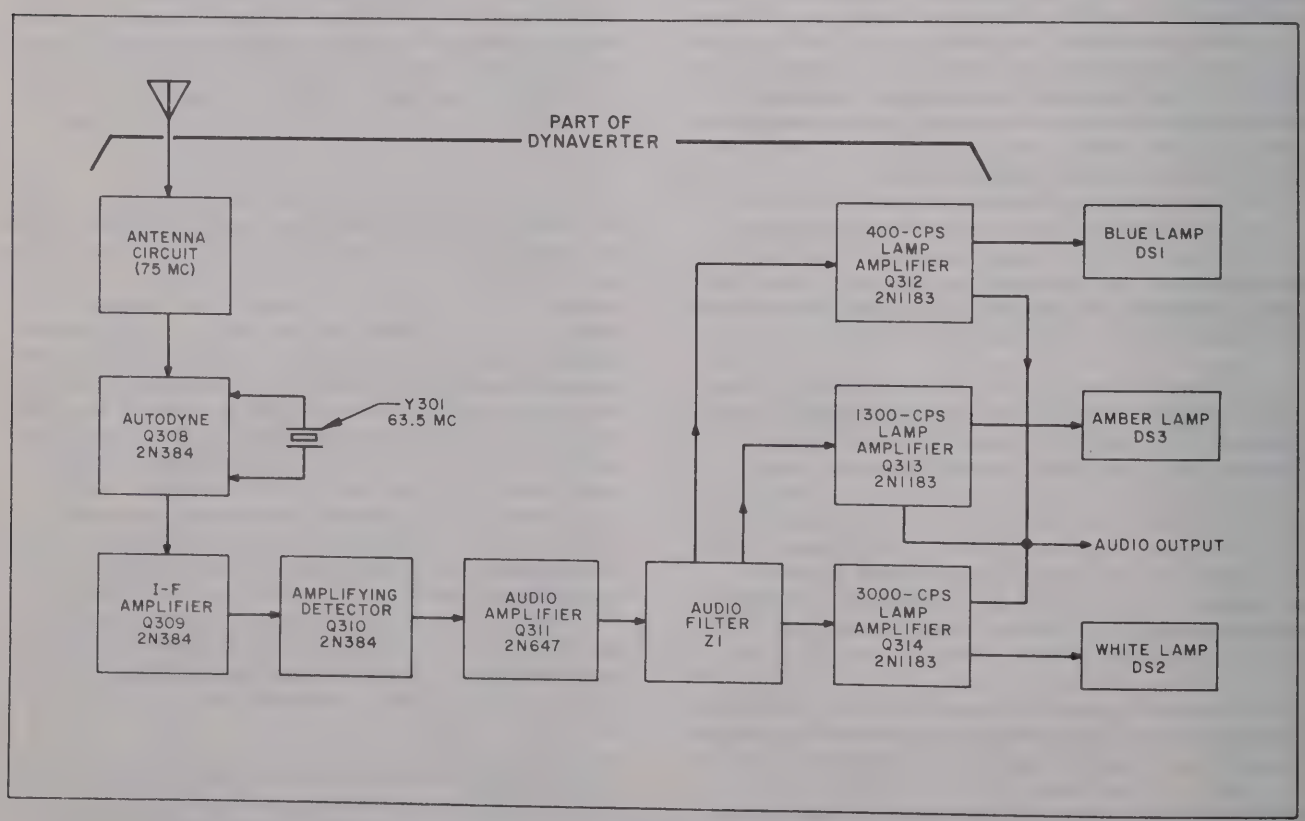


Figure 2-6. Marker Beacon Receiver, Block Diagram

Marker Beacon Receiver. The 75-mc marker beacon signal received by the antenna is coupled through a RG-58/U coaxial cable to J302 (see Figure 2-6). From J302 the signal is connected through the primary winding of T306 to a 75-mc tuned tank circuit consisting of the secondary winding of T306 and C309. T305 and C308 are a 63.5-mc series-resonant tuned circuit designed to minimize spurious oscillator radiation. The output from the tank circuit is coupled to an autodyne circuit which uses a 2N384 transistor, Q308, as the active circuit element. The autodyne oscillator circuit is governed by Y301 and has a resonant frequency of 63.5 mc. The tuned circuit, including T308 and C311, is the oscillator (collector) load at 63.5 mc. The difference frequency, 11.5 mc, is coupled through a tuned tank circuit, T307, to the base of i-f amplifier Q309. The output of Q309 is connected to a second tuned tank circuit, T309, and then coupled to the base of amplifying detector Q310.

Amplifying detector Q310 is similar in operation to an electron tube grid-leak detector. In the electron tube, detection takes place in the control grid-to-cathode portion and amplification takes place in the control grid-to-plate portion. In Q310, detection takes place in the base-to-emitter portion and amplification takes place in the emitter-to-collector portion. Q310 is biased for normal class A operation. The 11.5-mc i-f signal is demodulated by the diode portion (base-to-emitter) of Q310. The secondary winding of T309 is used as an r-f choke and provides a high impedance to the input r-f signal, but permits the demodulated signal coupled by C316 to return to the base in a reflex action. C315 and C317 by-ass the r-f component of the demodulated signal to ground. The amplified audio output of Q310, developed across R330, is connected through Q311 to Z301. Z301 consists of three circuits which are tuned to 400 cps, 1300 cps, and 3000 cps respectively. Each tuned circuit feeds one of the three lamp amplifiers Q312, Q313, or Q314. The output from each of these transistors is coupled to an indicator lamp on the instrument panel. When a marker beacon signal modulated at 400 cps is received, Q312 will conduct and the blue panel lamp will light; when a signal modulated at 1300 cps is received, Q313 will conduct and the amber panel lamp will light; when a signal modulated at 3000 cps is received, Q314 will conduct and the white panel lamp will light.

CESSNA NAV/COM 500

Maintenance

INTRODUCTION.

This section contains test equipment data; performance checks; trouble analysis information; adjustment and alignment, and removal and replacement procedures; lubrication data; and typical voltage, resistance, and stage gain measurements. Complete schematic and wiring diagrams of the units are included.

WARNING

VOLTAGES IN THIS EQUIPMENT ARE DANGEROUS AND MAY BE FATAL IF CONTACTED. OBSERVE ALL SAFETY PRECAUTIONS.

TEST EQUIPMENT AND ACCESSORIES.

The following Test Equipment lists the equipment and accessories required for maintenance of the Nav/Com 500; equivalent test equipment and accessories may be substituted.

PERFORMANCE CHECKS.

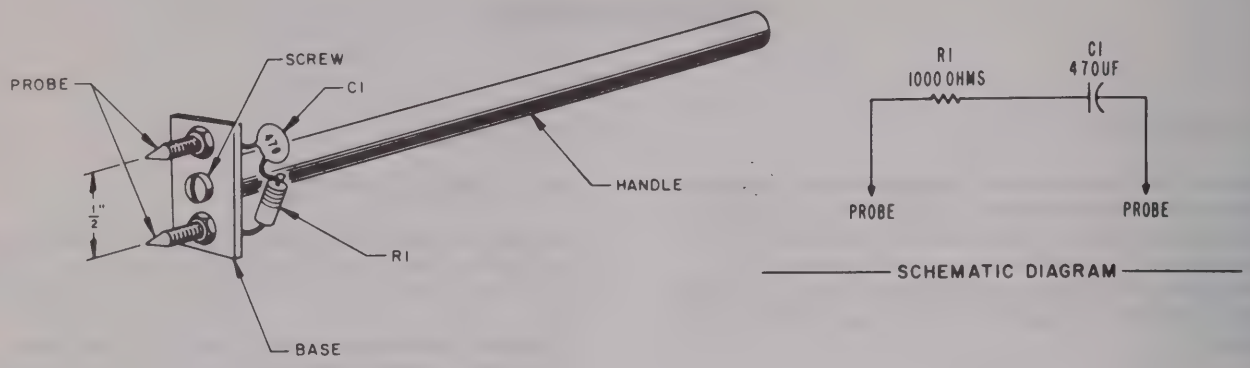
The performance check table outlines the procedures for checking the performance of the Nav/Com. The bench test interconnections are shown in Figure 2-10.

A specific performance check may be made without doing the preceding checks. But in such instances, the preliminary procedures of Steps 1 and 2 must be included.

All signal generator outputs are listed in hard* microvolts. With the Boonton Radio Corporation Type 505-B 6-db Attenuator, the attenuator dial of the signal generator in use reads hard microvolts directly. Without the 6-db attenuator the attenuator dial reading must be doubled to give the correct hard-microvolt reading.
*Hard microvolts are defined as equivalent open-circuit microvolts across a 50-ohm signal source.

TEST EQUIPMENT AND ACCESSORIES

Qty	Name	Designation or Characteristics
	TEST EQUIPMENT	
1	Audio Oscillator	Hewlett-Packard Model 200AB
1	Multimeter	Simpson Model 260
1	Oscilloscope	Tektronix Model 310
1	Power Supply	14- or 28-volt storage battery or rectified d-c supply
1	R-f Voltmeter	Boonton Radio Model 90-C
1	R-F Wattmeter	Bird Electronic Model 61
1	Signal Generator	Boonton Radio Type 211-A
1	Signal Generator	ARC Type H-14A
1	Signal Generator	Measurements Corp. Model 65-B
1	Signal Generator	Hewlett-Packard Model 608D
1	Vacuum Tube Voltmeter	Ballantine Model 300
1	Vacuum Tube Voltmeter	Hewlett-Packard Model 410B
	ACCESSORIES	
1	Adapter	UG-201/U
1	Adapter	UG-273/U
1	Adapter	UG-349A/U
1	Attenuator	Boonton Radio Type 505-B
1	Test Cable Harness	28895
1	Capacitor	4 ufd
1	Capacitor	22 ufd
1	Circuit Breaker	14-volt units: 10 amperes 28-volt units: 5 amperes
1	Connector*	27825
1	Connector*	27826
2	Connector*	27827



NOTE: BASE AND HANDLE ARE CONSTRUCTED OF NONCONDUCTIVE MATERIAL.

Figure 2-7. I-f Swamping Tool for Bench Testing

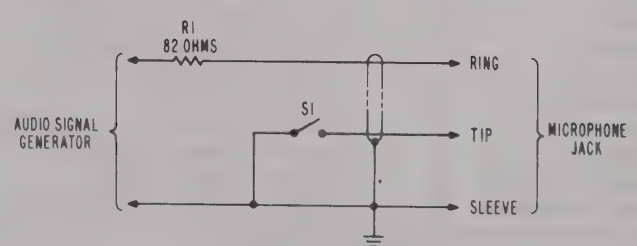
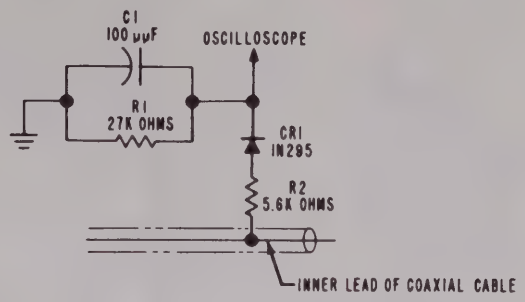
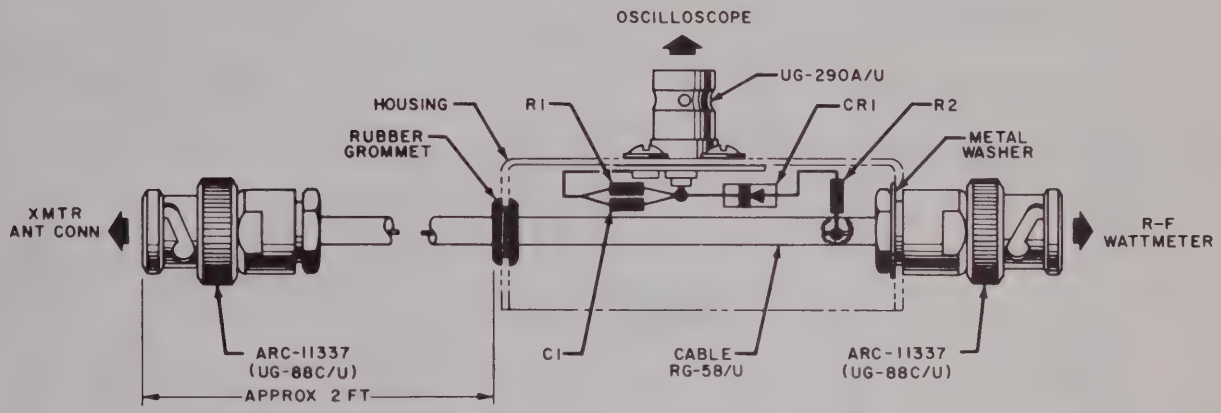


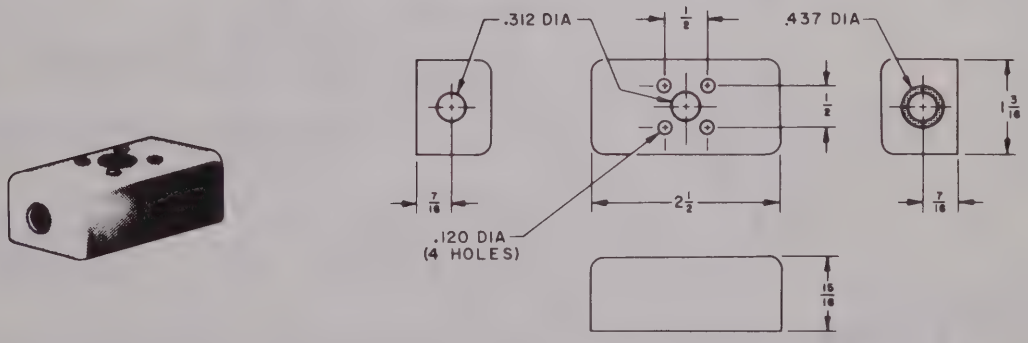
Figure 2-8. Dummy Microphone for Bench Testing



SCHEMATIC DIAGRAM



WIRING DIAGRAM



TYPICAL HOUSING
(.031 ALUMINUM)

NOTE: DIMENSIONS ARE IN INCHES.

Figure 2-9. Linear Detector for Bench Testing

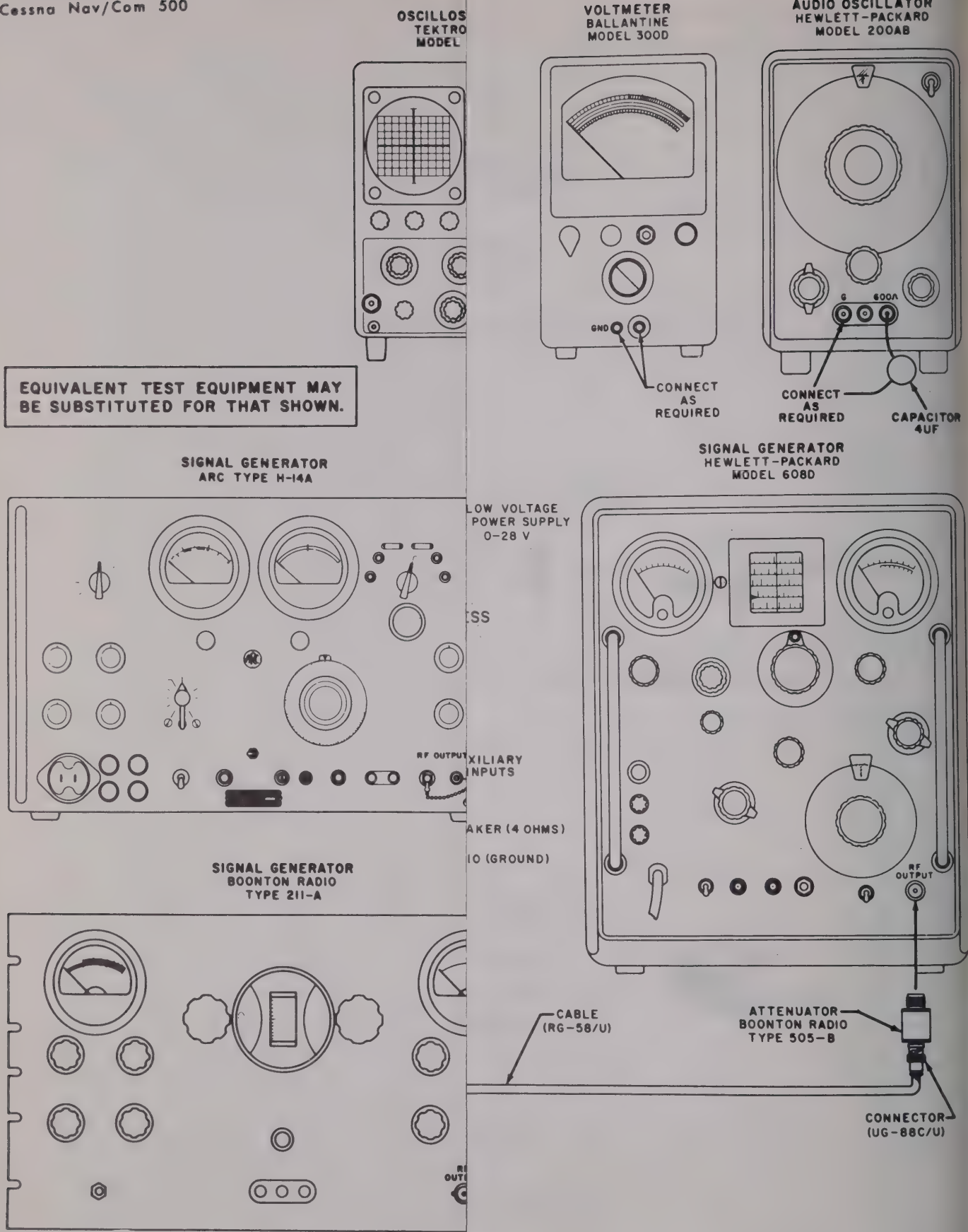


Figure 2-10. Nav/Com 500 Bench Test Interconnec

TEST EQUIPMENT AND ACCESSORIES - Continued

Qty	Name	Designation or Characteristics
	ACCESSORIES - Continued	
6	Connector	UG-88C/U
2	Connector	DAGE No. 8000-1
AR	Coaxial Cable	RG-58/U
1	Dummy Microphone+	See Figure 2-8
1	I-f Swamping Tool	See Figure 2-7
1	Linear Detector	See Figure 2-9
1	Marker Light Adapter Kit*	27847
1	Microphone+	
1	Speaker	4 ohms
1	Switch*	SPDT
1	Tool (Alignment)	Insulated broach type
1	Tool (Alignment)	Insulated slot type
1	Tuning Wand	Teflon wand with brass and iron tips

*Required if Cable Harness is not available.
+Either a conventional microphone or the dummy microphone shown in Figure 2-8 may be used.

NAV/COM 500 PERFORMANCE CHECKS

Step	Procedure	Normal Indications
	PRELIMINARY PROCEDURE	
1	Interconnect units of Nav/Com and test equipment as shown in Figure 2-10 test equipment shown unconnected will be connected as required.	None.
2	Apply primary voltage. Adjust voltage to 13.75 volts dc (14-volt model) or 27.5 volts dc (28-volt model). Turn VOL control clockwise to turn equipment on and adjust VOL to desired level. Adjust SQUELCH as required. Allow a 15-minute warm-up period.	Tube filaments and panel lamps light. Dynaverter whine audible.
	LOW-VOLTAGE CRYSTAL CHECK	
3	Adjust primary voltage to 11.0 volts dc (14-volt model) or 22.0 volts dc (28-volt model).	As noted.
4	Connect Boonton Type 211-A Signal Generator through Boonton Type 505-B 6-db Attenuator to J101.	None.
5	Set VOL and SQUELCH controls full clockwise. Set RCVR MC to 126.00 mc.	None.
6	Adjust Type 211-A for 126.00-mc output modulated 30%, 1000 cps. Set Type 211-A attenuator dial at 5.0 uv.	1000-cycle tone audible.
7	Set RCVR FRACT MC and tune Type 211-A to each fractional megacycle frequency.	1000-cycle tone audible at each frequency.
8	Set RCVR MC and tune Type 211-A to each megacycle frequency.	1000-cycle tone audible at each frequency.

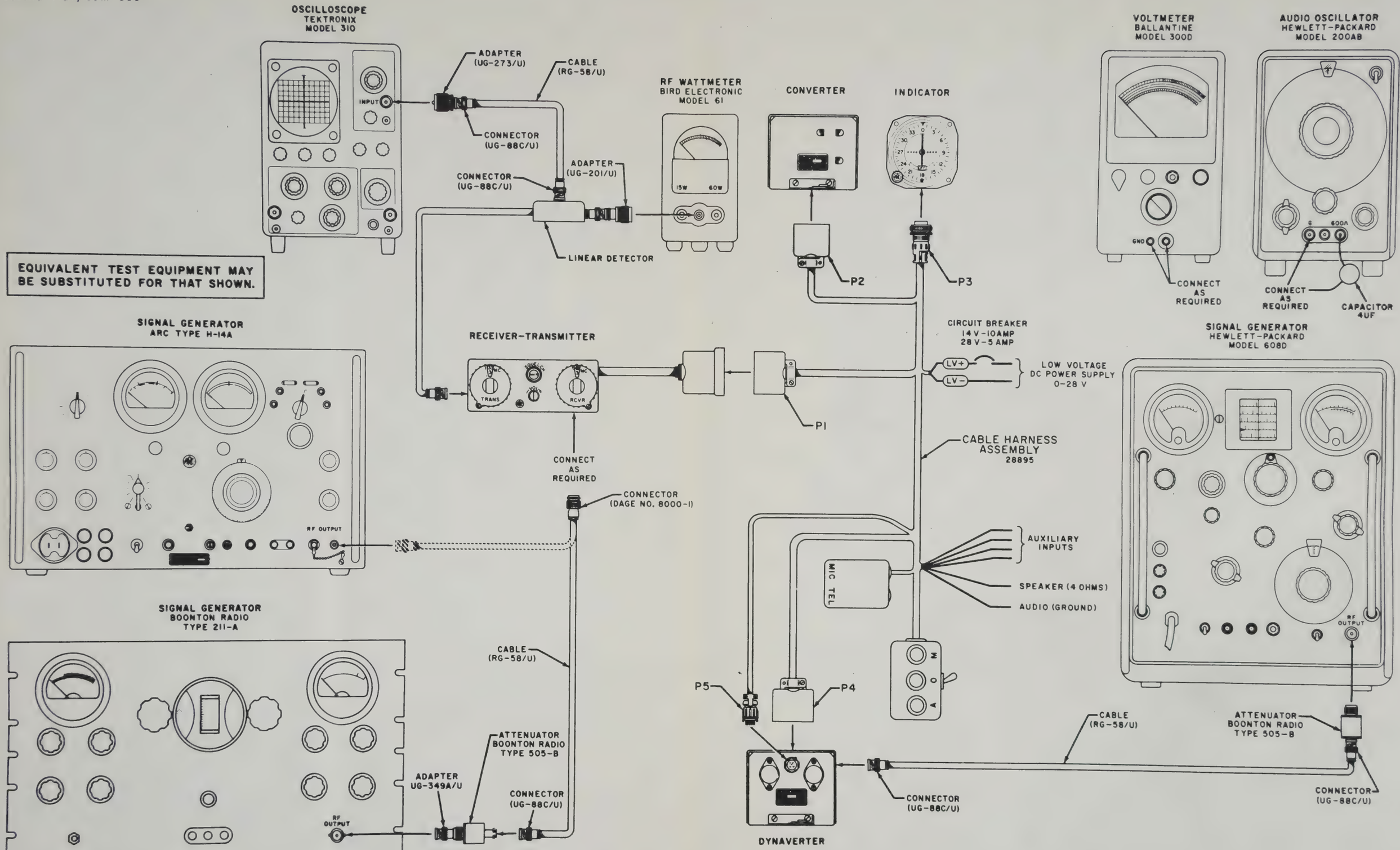


Figure 2-10. Nav/Com 500 Bench Test Interconnection Diagram

TEST EQUIPMENT AND ACCESSORIES - Continued

Qty	Name	Designation or Characteristics
	ACCESSORIES - Continued	
6	Connector	UG-88C/U
2	Connector	DAGE No. 8000-1
AR	Coaxial Cable	RG-58/U
1	Dummy Microphone+	See Figure 2-8
1	I-f Swamping Tool	See Figure 2-7
1	Linear Detector	See Figure 2-9
1	Marker Light Adapter Kit*	27847
1	Microphone+	
1	Speaker	4 ohms
1	Switch*	SPDT
1	Tool (Alignment)	Insulated broach type
1	Tool (Alignment)	Insulated slot type
1	Tuning Wand	Teflon wand with brass and iron tips

*Required if Cable Harness is not available.
+Either a conventional microphone or the dummy microphone shown in Figure 2-8 may be used.

NAV/COM 500 PERFORMANCE CHECKS

Step	Procedure	Normal Indications
	PRELIMINARY PROCEDURE	
1	Interconnect units of Nav/Com and test equipment as shown in Figure 2-10 test equipment shown unconnected will be connected as required.	None.
2	Apply primary voltage. Adjust voltage to 13.75 volts dc (14-volt model) or 27.5 volts dc (28-volt model). Turn VOL control clockwise to turn equipment on and adjust VOL to desired level. Adjust SQUELCH as required. Allow a 15-minute warm-up period.	Tube filaments and panel lamps light. Dynaverter whine audible.
	LOW-VOLTAGE CRYSTAL CHECK	
3	Adjust primary voltage to 11.0 volts dc (14-volt model) or 22.0 volts dc (28-volt model).	As noted.
4	Connect Boonton Type 211-A Signal Generator through Boonton Type 505-B 6-db Attenuator to J101.	None.
5	Set VOL and SQUELCH controls full clockwise. Set RCVR MC to 126.00 mc.	None.
6	Adjust Type 211-A for 126.00-mc output modulated 30%, 1000 cps. Set Type 211-A attenuator dial at 5.0 uv.	1000-cycle tone audible.
7	Set RCVR FRACT MC and tune Type 211-A to each fractional megacycle frequency.	1000-cycle tone audible at each frequency.
8	Set RCVR MC and tune Type 211-A to each megacycle frequency.	1000-cycle tone audible at each frequency.

NAV/COM 500 PERFORMANCE CHECKS - Continued

Step	Procedure	Normal Indications
	RECEIVER SENSITIVITY AND SQUELCH CHECK	
9	Set RCVR MC to 108.00 mc.	None.
10	Connect Boonton Type 211-A signal Generator through the Boonton Type 505-B 6-db Attenuator to J101 of Nav/Com. Adjust Type 211-A for 108.00-mc output modulated 30%, 1000 cps. Set Type 211-A attenuator dial at 2.0 uv. Connect Ballantine Model 300 vtvm between pin 1 of J301 on the Dynaverter and ground.	None.
11	Carefully adjust Type 211-A output in vicinity of 108.00 mc until dip in passband is noted on Model 300.	As noted.
12	Vary VOL control until Model 300 indicates +14 db (0.5 volt). Switch 1000-cps modulation off and observe drop in db as seen on vtvm.	Db drop should be 6db minimum.
13	Switch modulation on. Turn VOL control maximum clockwise and observe reading on vtvm.	Reading should be greater than 3 volts.
14	Rotate SQUELCH control maximum counterclockwise and observe output on vtvm.	Reading should be 0.3 volt maximum.
	RECEIVER AGC OPERATION	
15	Set RCVR MC to 108.00 mc.	None.
16	Connect Boonton Type 211-A Signal Generator through the Boonton Type 505-B 6-db Attenuator to J101 of Nav/Com. Adjust Type 211-A for 108.00-mc output modulated 30%, 1000 cps. Set Type 211-A attenuator dial at 2.0 uv.	None
17	Carefully adjust Type 211-A output in vicinity of 108.00 mc until dip in passband is noted on Ballantine Model 300 vtvm.	As noted.
18	Increase Type 211-A output to 10 uv.	None.
19	Turn VOL control until Model 300 indicates +14 db (0.5 volt).	None.
20	Increase Type 211-A output to 20,000 uv.	Output level on vtvm should be between 15 and 17 db.
21	Increase Type 211-A output to 2.0 volts.	Output level on vtvm should be between 16 and 19 db.
	CONVERTER VOR OPERATION	
22	Connect RF OUTPUT of ARC Type H-14A Signal Generator to J101 of Nav/Com.	None.
23	Set RCVR MC and RCVR FRACT MC to 114.90 mc. Set H-14A MC crystal switch to B (114.90 mc). Set H-14A MODULATION switch to 30~, ATTENUATOR control to 1000 uv, and OMNI TRACK control to 0°.	Course Indicator OFF/TO-FROM meter should read OFF.
24	Set H-14A MODULATION switch to 9960~.	OFF/TO-FROM meter indicates OFF.

NAV/COM 500 PERFORMANCE CHECKS - Continued

Step	Procedure	Normal Indications
	CONVERTER VOR OPERATION - Continued	
25	Set H-14A MODULATION switch to OMNI and CRS SEL pointer to 0°.	OFF/TO-FROM meter indicates TO. Vertical pointer should be near center.
26	Adjust CRS SEL pointer until vertical pointer is centered.	CRS SEL pointer should be at 0° ±2-1/2°.
27	Set H-14A OMNI TRACK control to 180°, ATTENUATOR control to 100 uv, and rotate CRS SEL knob for a vertical pointer reading of 5 dots to left. Note position of CRS SEL pointer. Rotate CRS SEL knob for a vertical pointer reading of 5 dots to right. Note position of CRS SEL pointer.	OFF/TO-FROM meter indicates FROM. Difference between 5-dot left reading and 5-dot right reading should be 20±1°.
28	Set H-14A OMNI TRACK control to 0° and reduce setting of ATTENUATOR control to 5 uv.	OFF/TO-FROM meter indicates TO.
29	Reduce setting of ATTENUATOR to minimum.	OFF/TO-FROM meter indicates OFF.
	LOCALIZER CHECK	
30	Set RCVR MC and RCVR FRACT MC to 110.90 mc. Set H-14A MC crystal switch to A (110.90 mc). Set H-14A ATTENUATOR control to 1000 uv.	None.
31	Set H-14A MODULATION switch to AMP LOC ⓘ (pointer center).	Indicator vertical pointer centers. OFF/TO-FROM meter reads TO. (If a 1-ma, 330-ohm, meter is used to replace the flag movement, its reading should be greater than 0.155 ma for a "pointer center" position.
32	Set H-14A MODULATION switch to AMP LOC ⊘ (pointer left).	Vertical pointer swings left to outer edge of blue sector. OFF/TO-FROM meter indicates TO. (This condition corresponds to 90 ua in meter movement. A 1000-ohm, 200-0-200 microammeter may be substituted for the indicator if desired.)
33	Set H-14A MODULATION switch to AMP LOC ⊘ (pointer right).	Vertical pointer swings right to outer edge of yellow sector within about one pointer width. (Meter currents should be 90 ua ±5 ua.) OFF/TO-FROM meter reads TO.
34	Set H-14A MODULATION switch to 90~.	OFF/TO-FROM meter indicates OFF.
35	Set H-14A MODULATION switch to 9960~.	OFF/TO-FROM meter indicates OFF.
36	Set H-14A OMNI TRACK control to 0° and reduce setting of ATTENUATOR control to 5 uv.	OFF/TO-FROM meter indicates TO.
37	Reduce setting of ATTENUATOR to minimum.	OFF/TO-FROM meter indicates OFF.

NAV/COM 500 PERFORMANCE CHECKS - Continued

Step	Procedure	Normal Indications
	TRANSMITTER LOW-VOLTAGE OUTPUT CHECK	
	CAUTION Do not key the transmitter when transmitter megacycle channel selector switch is set to either of the two red-dot positions between 118 and 135 mc.	
38	Set TRANS MC and TRANS FRACT MC to 135.95 mc. Key transmitter and read unmodulated power output on Bird Electronic Model 61 RF Wattmeter.	R-f wattmeter should indicate the output.
39	Repeat step 38 for all settings of the TRANS MC switch, and then for all settings of the TRANS FRACT MC switch.	R-f wattmeter should indicate the output for each setting.
40	Increase primary voltage input to rated level: 13.75 volts dc (14-volt model) or 27.5 volts dc (28-volt model).	None.
41	Repeat Step 38 for all settings of the TRANS MC switch, and then for all settings of the TRANS FRACT MC switch.	Power output should be 4.5 watts minimum for each setting.
	MODULATOR PERFORMANCE AND CLIPPING LEVEL	
42	Adjust VERT POSITION and VERT AMP controls of Tektronix Model 310 Oscilloscope until horizontal trace is at middle of screen when transmitter is keyed and at bottom of screen when transmitter is not keyed. Note relative position of each condition on scope face.	None.
43	Inject 1000-cps, 1-volt signal from Hewlett-Packard Model 200AB Audio Oscillator into dummy microphone circuit. Key transmitter.	Carrier is modulated at greater than 85 per cent.
44	Increase output of Model 200AB to 2 volts.	Carrier is modulated at less than 100 per cent.
	MARKER BEACON RECEIVER OPERATION	
45	Using crystal calibrator of Hewlett-Packard Model 608D Signal Generator, tune Model 608D to 75 mc. Connect Hewlett-Packard Model 200AB Audio Oscillator to EXT MOD connector of Model 608D. Adjust Model 200AB for 95% modulation at 400 cps.	None.
46	Connect Ballantine Model 300 vtvm between pin A of J303 in dynaverter and ground. Set MKR control fully clockwise.	None.
47	Increase r-f output of Model 608D until 3 volts is measured on Model 300.	Blue lamp should light. R-f output should be from 2500 uv to 3500 uv.
48	Increase output of Model 608D to 30,000 uv.	Vtvm should indicate from 1.2 to 1.6 volts.
49	Vary output of Model 608D between 3000 and 100,000 uv.	Blue lamp only should light.
50	Repeat Steps 45 through 49 except connect Model 300 between pin H of J303 in dynaverter and ground, and adjust modulation to 1300 cps.	As noted in Steps 45 through 49, except amber lamp is affected.

NAV/COM 500 PERFORMANCE CHECKS - Continued

Step	Procedure	Normal Indications
	MARKER BEACON RECEIVER OPERATION - Continued	
51	Repeat Steps 45 through 49, except connect Model 300 between pin D of J303 in dynaverter and ground, and adjust modulation to 3000 cps.	As noted in Steps 45 through 49, except white light is affected.

5-4. TROUBLE ANALYSIS.

General. Trouble-shooting requires a systematic method of localizing the trouble, first to the unit in which the malfunction exists, then to a particular stage or to a functionally related group of stages, and finally to the defective part or parts. Trouble-shooting based on a normal operating procedure will often help to determine which unit is at fault. An effective state-by-stage test can then be made by signal tracing to isolate the faulty stage; sensitivity testing can also help to identify the stage. When the trouble has been traced to a particular stage, the faulty part or group of parts may be isolated and identified by a trouble-shooting procedure which may include tube testing; voltage, resistance, and stage gain measurements; and finally, repair or replacement of the defective part.

Trouble-Shooting Chart. The trouble-shooting chart lists the symptoms of some possible troubles, their probable causes, and the analysis procedures that may be used to verify each probable cause. To assist in localizing trouble, reference should be made to the circuit theory discussion in "Principles of Operation", and the schematic "Diagrams" section.

NAV/COM 500 TROUBLE-SHOOTING CHART

Symptom	Probable Cause	Analysis Procedure
	RECEIVER CIRCUITS	
No audio output from phones or loudspeaker; navigation output normal.	Audio detector CR105.	Check forward and back resistance of diode. Forward resistance should be less than 1000 ohms. Back resistance should be at least 10,000 times forward resistance.
	Defective part in audio output circuit.	Touch grid of V109A with blade of screwdriver. If no sound is heard from loudspeaker, check ground path through R146 and arm of marker volume control R154B. Check audio output transformer T310 for open or shorted winding. Make voltage and resistance measurements of audio stages.
	First audio V110A or squelch control V110B.	Check for audio at arm of VOL control R158, If no sound is heard from loudspeaker, check R157 and C166. If C166 is shorted or leaky, entire squelch system will be upset. Make voltage and resistance measurements of V110B and associated parts.
No audio output from loudspeaker; phone and navigation output normal.	Defective part in Dynaverter audio amplifier circuit.	Check continuity of T301 primary winding (pins 1 to 2). Make voltage measurements of Q304, Q305, Q306, and Q307. Make continuity measurements of associated parts.
Audio weak or distorted, or both. Navigation output normal.	Noise limiting diode CR102.	Check forward and back resistance of diode. Forward resistance should be less than 1000 ohms. Back resistance should be at least 10,000 times forward resistance.
	Noise limiting capacitor C171 or associated parts.	Check C171 and associated biasing network for shorts and open resistors. Check operation of VOL control R158.

NAV/COM 500 TROUBLE-SHOOTING CHART - Continued

Symptom	Probable Cause	Analysis Procedure
	RECEIVER CIRCUITS - Continued	
Audio weak or distorted, or both. Navigation output normal. (Cont)	Q304 or Q305, in Dynaverter, shorted.	Make voltage measurements of Q304 and Q305.
Audio output normal. No navigation output.	Alignment of S101C.	Check switch and related parts for proper alignment.
	Navigation cathode follower V109B or associated parts.	Make voltage and resistance measurements of V109B. Check continuity of associated parts.
	VOR/localizer relay K401, in converter.	Check continuity of relay solenoid and contacts.
Low sensitivity.	I-f amplifier stage.	Make voltage resistance, and stage gain measurements of V104, V106, and V107. Make continuity measurements of interstage coupling transformers T102, T103, T104, T105, and T106. Note When an interstage transformer is suspected of being faulty, observe fall-off in output as transformer is detuned slightly. If the fall-off is not well defined, check associated winding and resonating capacitor. When detuning, note that 2-mc tuning is much sharper than that at 455 kc; also that bottom slug of T106 normally tunes very broadly.
	Converter V105 or associated parts.	Make stage gain measurements of V104 and V105. At pin 7 of V105, if 455-kc sensitivity is normal but 2-mc sensitivity poor, check Y140 for proper operation. If C133 (screen bypass for V105) opens, symptoms will be similar.
Receiver and transmitter inoperative on all channels.	Dynaverter power supply.	With transmitter unkeyed, check for 280 volts dc at pin 10 of J301. If voltage is not present, make voltage measurements of Q302, Q303, and associated parts.
	Fractional megacycle oscillator V108B, or associated parts.	Make voltage and resistance measurements of V108B. Check mechanical parts associated with fractional megacycle crystal board and wiper.
Extreme variations in sensitivity as receiver is switched through its fractional positions.	Triple-tuned filter T101 or associated parts.	Substitute new 5654 tube for V102. Carefully check C159 for defects. If both V102 and C159 are good, replace T101 (28713). Do not attempt to realign T101.
The sensitivity varies across band; very low at one end only.	Megacycle oscillator V108A or associated parts.	Make voltage, resistance, and stage gain measurements of V108A.
	Alignment of C150.	Check alignment of C150.
Weak signal sensitivity is normal, but receiver blocks on high-level signals.	Defective part in avc circuit.	Check avc filter C172 and detector filter C173 for leaks or shorts. Check forward and back resistance of avc clamp CR104. Forward resistance should be less than 1000 ohms. Back resistance should be at least 10,000 times front resistance.

NAV/COM 500 TROUBLE-SHOOTING CHART - Continued

Symptom	Probable Cause	Analysis Procedure
	RECEIVER CIRCUITS - Continued	
No squelch operation. Audio output distorted and excessively loud. Over-all receiver gain very low.	Squelch control tube V110B or associated parts.	Make voltage and resistance measurements of V110B. Using an ohmmeter, check linearity of squelch control operation.
Receiver is noisy when vibrated or tapped.	Microphonic circuit(s) caused by defective tube or loose solder joint.	Start at front end of receiver and trace signal through each stage, disabling stage immediately preceding the point of signal injection.
Receiver operates intermittently on one or more channels. Operation may be corrected by rechanneling.	Misaligned or defective crystal; dirty wiper arm on crystal contact.	Tune to intermittent channel and manually rock crystal boards and wiper contacts.
Navigational and audio output very low (gradually more severe as the antenna is reached with stage gain measurements).	Navigation level-adjusting resistor R164 or R172.	Localize trouble with stage gain measurements. Check resistors.
Communication operation normal. Vertical pointer of indicator shows error which increases as signal level is increased.	Gassy tubes or malfunction in avc circuit.	In sequence, substitute new tubes for V101, V102, V104, and V106. If trouble persists, check forward and back resistance of avc attack diode CR106. Forward resistance should be less than 1000 ohms. Back resistance should be at least 10,000 times front resistance. Check R163 for a short.
Poor flag sensitivity; all other operations are normal.	I-f potentiometer R129 misadjusted.	Reasjust R129.
	Low gain in i-f circuit.	Make stage gain measurements of receiver circuit. Localize defective part by voltage measurements.
The first syllable(s) of voice signals garbled or completely missing.	Squelch circuit.	Check operation of SQUELCH control. Make voltage measurements on V110B and check for normal operation.
	TRANSMITTER CIRCUITS	
Low or no power output on all channels. Receiver operating normally.	Defective tube or associated part.	Make voltage and resistance measurements of transmitter circuits.
	Improper alignment.	Check transmitter power output. Realign circuits.
Improper operation of sidetone circuit. Output weak or very loud.	R317 in Dynaverter improperly adjusted or defective.	Adjust R317. Using an ohmmeter, check R317 for linear operation.
No modulation of carrier; receiver operation normal; sidetone audible.	Microphone amplifier Q301.	Make voltage measurements of Q301.
	T304 secondard winding, pins 4 and 5, open or associated wiring defective.	Make continuity measurements of T304. Check wiring to transformer.

NAV/COM 500 TROUBLE-SHOOTING CHART - Continued

Symptom	Probable Cause	Analysis Procedure
TRANSMITTER CIRCUITS - Continued		
No modulation of carrier; receiver operation normal; sidetone audible. (Cont)		Note Secondary winding, pins 6 and 7, of T304 is load for cabin speaker and provides modulated pickoff for sidetone.
Low or no modulation; receiver output weak or distorted, or both.	Q304, Q305, Q306, or Q307.	Make stage gain measurements of audio stages. Check transistor voltages.
Transmitter not operative on one or more channels. Rechanneling may correct operation temporarily. Receiver operation normal.	Transmitter megacycle crystal. Dirty wiper arm, or crystal contact on megacycle crystal bank.	Replace suspected crystal. Check wiper arm and crystal contacts for dirt.
CONVERTER		
No output from Converter. Communication receiver operates normally.	Common channel failure.	Using Ballantine Model 300 Voltmeter, check for 9.8 volts ac at pin 8 of V404B. If voltage is normal, proceed with next probable cause. If voltage is not normal, check voltages at V404A and V404B.
	Variable channel failure.	With receiver tuned to a VOR channel, check for 16 volts ac at pin 8 of V405B using Ballantine Model 300 Voltmeter. If voltage is normal, proceed with next probable cause. If voltage is not normal, check voltages at V405A and V405B test points. Check R453, R452, and operation of VOR/localizer relay K401.
	Reference channel failure.	With receiver tuned to a VOR channel, check for 31 volts ac at pin 1 of V403B using Ballantine Model 300 Voltmeter. If voltage is normal, proceed with next probable cause. If voltage is not normal, check for 4 volts ac at pin 8 of V402A. If voltage is normal at V402A, substitute a standard for the indicator under test, then check voltages at V403A. If voltage is not normal at pin 8 of V402A, check voltages at V401A and V401B.
	Phase detector CR407 or CR 408.	Using an ohmmeter, check detail parts of phase detector. Check forward and back resistance of each diode. Forward resistance should be less than 1000 ohms. Back resistance should be at least 10,000 times front resistance.
Operation of receiver normal on VOR channel but not normal on localizer channel.	Common channel failure.	With receiver tuned to a localizer channel, check for 9.8 volts ac at pin 8 of V404B using Ballantine Model 300 Voltmeter. If voltage is normal, proceed with next probable cause. If voltage is not normal, check voltages at V404A and V404B.

NAV/COM 500 TROUBLE-SHOOTING CHART - Continued

Symptom	Probable Cause	Analysis Procedure
	CONVERTER - Continued	
Operation of receiver normal on VOR channel but not normal on localizer channel. (Cont)	VOR/localizer relay K401.	Channel receiver between 108.1 mc and 108.2 mc. Relay K401 should energize on 108.1 (localizer frequency) and be de-energized on 108.2 (VOR frequency). If relay operation is not normal, check continuity of relay solenoid (pins 17 and 18) and condition of relay contacts.
	Localizer detector CR410 and CR411.	Using an ohmmeter, check detail parts of localizer detector. Check forward and back resistance of each diode. Forward resistance should be less than 1000 ohms. Back resistance should be at least 10,000 times front resistance.
Settings of indicator are not accurate.	Indicator.	Substitute a "standard" for the indicator under test. If trouble remains after substitutions, refer to next probable cause.
	Improper phase shift in reference or variable phase converter circuits.	Apply a 40-uv, 30%-modulation VOR signal to receiver. Adjust indicator for an on-course (pointer center) indication. Check alignment of converter VOR circuits. If normal, use oscilloscope to verify phase relationships.
With receiver tuned to and within range of a localizer signal, OFF/TO-FROM meter reads OFF.	Localizer flag diode CR409.	Check forward and back resistance of diode. Forward resistance should be less than 1000 ohms. Back resistance should be at least 10,000 times front resistance.
	Faulty contacts on VOR/localizer relay K401.	Disconnect converter from bench test setup. Apply 13.75 volts dc (14-volt units) or 27.5 volts dc (28-volt units) between pins 12 and 15 of connector J401. Check for continuity between relay contacts 11 and 12 of K401.
With receiver tuned to and within range of a localizer signal, OFF/TO-FROM meter indicates FROM. OFF/TO-FROM meter indicates FROM with a TO VOR course.	Wires between converter and indicator incorrectly interconnected.	See Figure 2-15 and interchange leads between pins 4 and 5 of J401 if required.
With the receiver tuned to a TO VOR course, OFF/TO-FROM meter shows FROM. Operation of flag on localizer normal.	VOR OFF/TO-FROM diode CR405 or CR406.	Check forward and back resistance of each diode. Forward resistance should be less than 1000 ohms. Back resistance should be at least 10,000 times front resistance.
	MARKER BEACON RECEIVER	
Marker receiver inoperative on all modulating frequencies.	Defective part in audio amplifier circuit.	Tune Hewlett-Packard Model 200AB Audio Oscillator to 1300 cps. Connect oscillator output through .01-uf capacitor to base of Q311. If 1300-cps lamplights and normal audio is heard, proceed with next probable cause. If operation is unsatisfactory, make voltage measurements of Q311.

NAV/COM 500 TROUBLE-SHOOTING CHART - Continued

Symptom	Probable Cause	Analysis Procedure
MARKER BEACON RECEIVER - Continued		
Marker receiver inoperative on all modulating frequencies. (Cont)	Defective part in i-f amplifier or amplifier-detector circuit.	Tune Hewlett-Packard Model 608D Signal Generator to 11.5 mc, and adjust Model 200AB Audio Oscillator for 95% modulation at 1300 cps. Connect signal generator output through .01-uf capacitor to base of Q309. With no 75-mc input to the receiver, increase signal to determine if i-f amplifier Q309, i-f transformer T309, and amplifying detector Q310 are normal. If normal, proceed with next probable cause. If abnormal, measure voltages on Q309 and Q310. Check continuity of windings on T309.
	Input circuit, autodyne Q308, or first i-f transformer T307.	Tune Hewlett-Packard Model 608D to 75 mc and Model 200AB for 95% modulation at 1300 cps. Connect signal generator output through .01-uf capacitor to antenna jack J302. If operation is satisfactory, check marker beacon antenna and antenna lead-in cable. Make voltage measurements of Q308. Check Y301.
ow sensitivity on all of ie modulating frequencies.	Low input voltage.	Check low-voltage input at pin 17 of J301. Voltage should be 13.75 volts dc (14-volt units) or 27.5 volts dc (28-volt units).
	Improper alignment.	Perform alignment procedure.
ll lamps operate normally, but audio output(s) lefective.	Capacitor C320 shorted.	Check C320.
	R336, R337, or R338.	Tune Hewlett-Packard Model 200AB Audio Oscillator to 400 cps, 1300 cps, and 3000 cps. Check operation of indicator lamp associated with each frequency. Check resistor associated with inoperative lamp: R336 for 400 cps, R337 for 1300 cps, and R338 for 3000 cps.
Sufficient audio output but one lamp fails to light.	Defective lamp.	Depress lamp cap to check lamp.
	Lamp amplifier Q312, Q313, or Q314.	Make voltage measurements on transistor associated with inoperative lamp: Q312, 400 cps (blue); Q313, 1300 cps (amber); Q314,3000 cps (white). Adjust Hewlett-Packard Model 200AB Audio Oscillator to correct modulation frequency for defective lamp. Connect output through .01-uf capacitor to collector of Q311. Check to see if replacement transistor cures malfunction.
One lamp lights continuously regardless of input signal strength or modulating frequency.	Lamp amplifier Q312, Q313, or Q314. Emitter to collector short	Make voltage measurements of transistor associated with the malfunctioning lamp; Q312 (blue), Q313 (amber), Q314 (white).
False lighting (two or three lamps light simultaneously).	Distortion in audio circuit.	Check setting of MKR volume control on front panel of Nav/Com. Make voltage measurements of Q310 and Q311. Check associated parts.
	Crystal diode CR407.	Check forward and back resistance of diode. Forward resistance should be less than 1000 ohms. Back resistance should be at least 10,000 times front resistance.

NAV/COM 500 TROUBLE-SHOOTING CHART - Continued

Symptom	Probable Cause	Analysis Procedure
MARKER BEACON RECEIVER - Continued		
Very high sensitivity as indicated by high background noise in audio output.	Part of audio amplifier Q311 emitter circuit.	Make voltage measurement of Q311 emitter. Carefully check C318, R332, and R333.

NAV/COM 500 TRANSMITTER ALIGNMENT AND ADJUSTMENT PROCEDURES.

General. The following paragraphs describe adjustment and alignment of the transmitter circuits in the receiver-transmitter. Except for the adjustment of the fractional and whole megacycle switches, the procedures are arranged in the order they should be performed if complete alignment is necessary. Any one of the procedures may be performed individually provided the preliminary procedure is included. In addition to the usual reasons for alignment, alignment may be required as a result of a part replacement. Although only the circuit affected need be aligned, for optimum performance the alignment of related circuits should be checked.

Transmitter Fractional Megacycle Switch. If the Nav/Com has been disassembled, adjust the TRANS FRACT MC switch as follows:

Step 1. Carefully center the rotor contact of S102A on any printed stator contact other than the two lower middle ones. Tighten the two rotor hub setscrews.

Step 2. Secure TRANS FRACT MC knob on shaft in any position. As shown in Figure 2-11 rotate the knob until the rotor contact of S102A stops on the printed stator contact of the 22.774-mc crystal.

Step 3. Loosen setscrews in TRANS FRACT MC knob and rotate knob to center 95 in lower portion of window. Retighten the setscrews.

Transmitter Megacycle Switch. If the Nav/Com has been disassembled, adjust the TRANS MC switch during the reassembly as follows:

Step 1. Carefully center the rotor contact of S201 on any printed stator contact other than the two lower middle ones. Tighten the two rotor hub setscrews.

Step 2. Secure TRANS MC knob on shaft in any position. As shown in Figure 2-11, rotate the knob until the rotor contact of S201 stops on the printed stator contact of the 105.176-mc crystal.

Step 3. Loosen setscrews in TRANS MC knob and rotate knob to center 27 in upper portion of windown. Retighten the setscrews.

Step 4. Center rotor contact, on each of the five printed inductor boards, between the eyelets designated by a red dot.

Step 5. Tighten the two setscrews in each hub.

Preliminary Procedure.

Step 1. Solder a piece of wire between the arm and normally open contact of K101 (see Figure 2-12). Remove this wire after transmitter alignment is completed.

Step 2. Interconnect the Nav/Com and test equipment as shown in Figure 2-10.

Step 3. Apply rated primary power (13.75 volts dc for 14-volt units and 27.5 volts dc for 28-volt units). Turn test equipment on. Turn VOL knob clockwise until power switch operates. Allow at least a 15-minute warm-up period before making electrical adjustments.

Step 4. Set modulated-B+ on-off switch, S1, shown in Figure 2-10, off.

Transmitter Fractional Megacycle Oscillator.

Step 1. Insert a piece of insulating paper between the wiper and printed contacts of S102B to prevent the receiver fractional megacycle oscillator rotor from contacting the selected crystal.

Step 2. Turn TRANS FRACT MC knob to .95 mc.

Step 3. Connect d-c probe of Hewlett-Packard Model 410B voltmeter to TP4. Set voltmeter to read -1 volt full scale.

Step 4. Adjust slug of T201 until a reading is noted on voltmeter; then turn TRANS FRACT MC knob to .0 mc.

Step 5. Readjust slug of T201 until a reading is noted on voltmeter. Adjust T201 while switching between the settings of .95 mc and .0 mc until the voltage noted at .0-mc position is at least 70 per cent of that obtained at the .95-mc position. Minimum voltage at either position must be -0.2 volt.

Step 6. Remove the insulating paper, unless the megacycle oscillator is to be aligned.

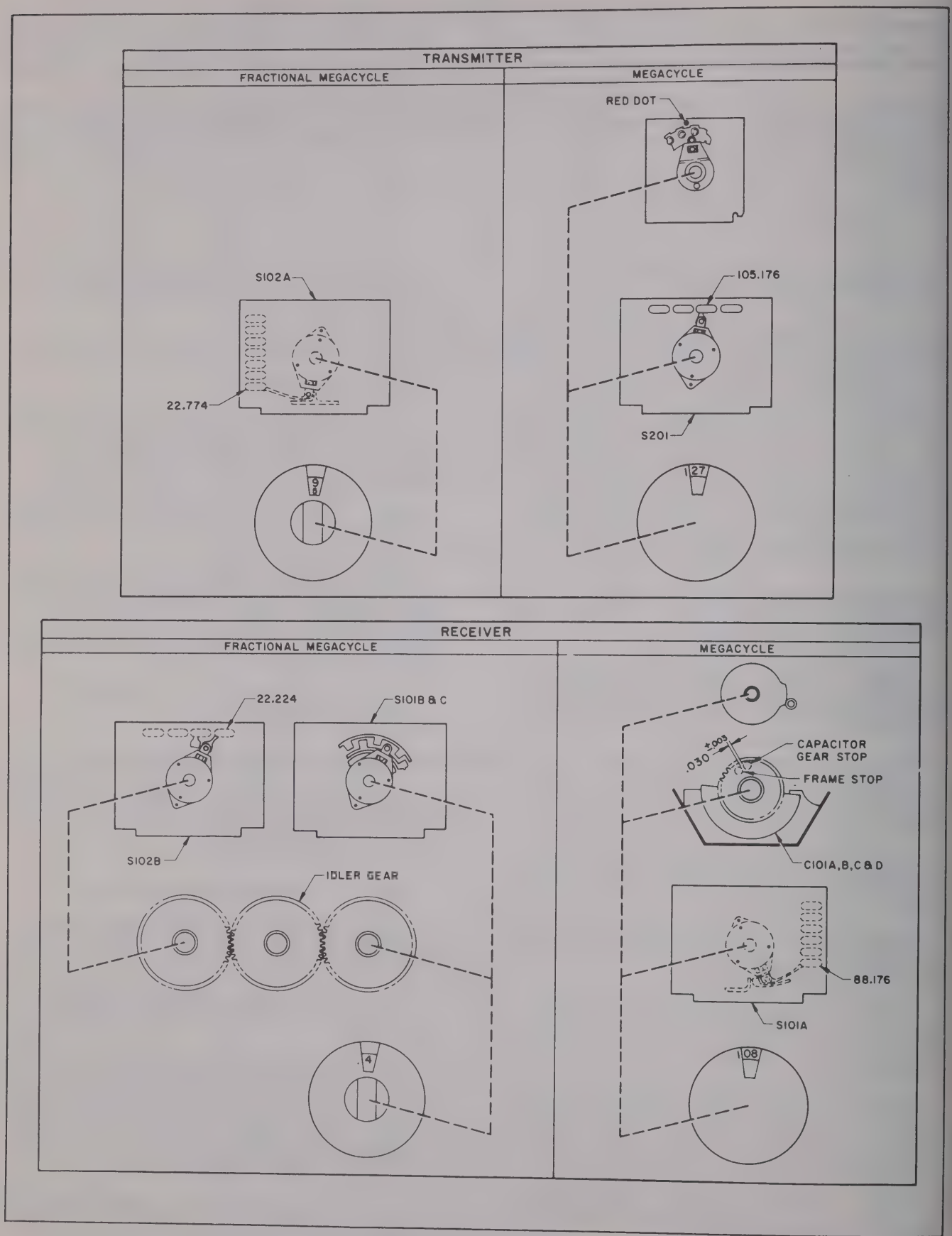


Figure 2-11. Receiver-Transmitter, Mechanical Adjustments

Transmitter Megacycle Oscillator.

Step 1. Insert a piece of insulating paper between the wiper and printed contacts of S102B and S102A. This procedure is necessary to eliminate fractional megacycle oscillator voltage at TP4 during alignment of the megacycle oscillator. Key the transmitter.

Step 2. Connect d-c probe of Hewlett-Packard Model 410B voltmeter to TP4. Set voltmeter to read -1 volt full scale.

Step 3. Turn TRANS MC knob to 135 mc.

Step 4. Adjust either C242 or L215 until a reading is noted on voltmeter; then turn TRANS MC knob to 118 mc.

Step 5. Readjust either C243 or L215 until a reading is noted on voltmeter; then peak C242.

Step 6. Turn TRANS MC knob back to 135 mc and adjust L215 for peak.

Step 7. Continue adjusting C242 at 118 mc and L215 at 135 mc until there is no further peaking at either position. Minimum voltage at either position should be 0.1 volt.

Step 8. Turn TRANS MC knob to 118 mc and note reading on voltmeter. Turn C242 counterclockwise (reducing capacity) until voltmeter reads 70 per cent of peak reading noted in Step 7.

Step 9. Set TRANS MC knob to 135 mc. Adjust L215 for a peak reading on the vtvm, and note this reading. Adjust L215 clockwise (reducing inductance) until the vtvm reads 70 per cent of the reading noted in this step.

Step 10. Repeat Steps 8 and 9 to verify that vtvm reads 70 per cent of peak readings.

Step 11. At each position of TRANS MC knob, note reading on vtvm; reading should be greater than -0.1 volt at each position.

Step 12. Add capacity to the circuit by inserting a piece of metal such as a screwdriver between the transmitter megacycle oscillator, V103, and its associated tank circuit. At each position of the TRANS MC knob the oscillator output should be at least 10 per cent above the reading noted in Step 11. If necessary, readjust C242 or L215, or both, to satisfy this requirement.

NOTE

Detuning of the transmitter megacycle oscillator on the high-frequency side of peak is necessary to ensure stable operation. This is due to the inherent characteristic of a crystal-controlled, grounded-grid oscillator which exhibits a sharp drop-off characteristic on the low-frequency side of peak. Tuning on peak or on the low-frequency side of peak can result in intermittent oscillator output under enviromental conditions.

Step 13. Check lowest output channel for operation on 11 volts for 14-volt units and 22 volts for 28-volt units.

Step 14. Remove insulating paper.

Mixer.

Step 1. Key the transmitter.

Step 2. Connect d-c probe of Hewlett-Packard Model 410B voltmeter to TP5, Set voltmeter to read -5 volts full scale.

Step 3. Turn TRANS FRACT MC knob to .50 mc. Turn TRANS MC knob to 118 mc.

Step 4. Adjust C231 or L213 until a reading is noted on voltmeter. Turn TRANS MC knob to 135 mc and peak L213. Turn TRANS MC knob to 118 mc, and using an insulated adjusting tool, peak C231.

NOTE

There will be a slight detuning when the adjusting tool is removed from C231. To compensate for this detuning, note the peak reached on the voltmeter while tuning C231; then detune counterclockwise so that when the tool is removed, the voltmeter will show the peak reading.

Continue adjusting C231 at 118.50 mc and L213 at 135.50 mc until there is no further peaking noticed at either position. Final voltmeter readings should be no less than 0.2 volt.

Buffer.

Step 1. Key the transmitter.

Step 2. Connect d-c probe of Hewlett-Packard Model 410B voltmeter to TP6. Set voltmeter to read -10 volts full scale.

Step 3. Tune transmitter to 118.50 mc and adjust C225 or L210 until a reading is noted on voltmeter.

Step 4. Tune transmitter to 135.50 mc and peak L210. Then tune to 118.50 mc and peak C225. Continue adjusting L210 at 135.50 mc and C225 at 118.50 mc until there is no further peaking at either position.

Driver and Power Amplifier.

Step 1. Connect a 50-ohm resistive load, such as a Bird Electronic Model 61 Wattmeter, to transmitter output J201. Set modulated-B+ on-off switch on. Key the transmitter.

Step 2. Connect d-c probe of Hewlett-Packard Model 410B voltmeter to TP7. Set voltmeter to read -100 volts full scale.

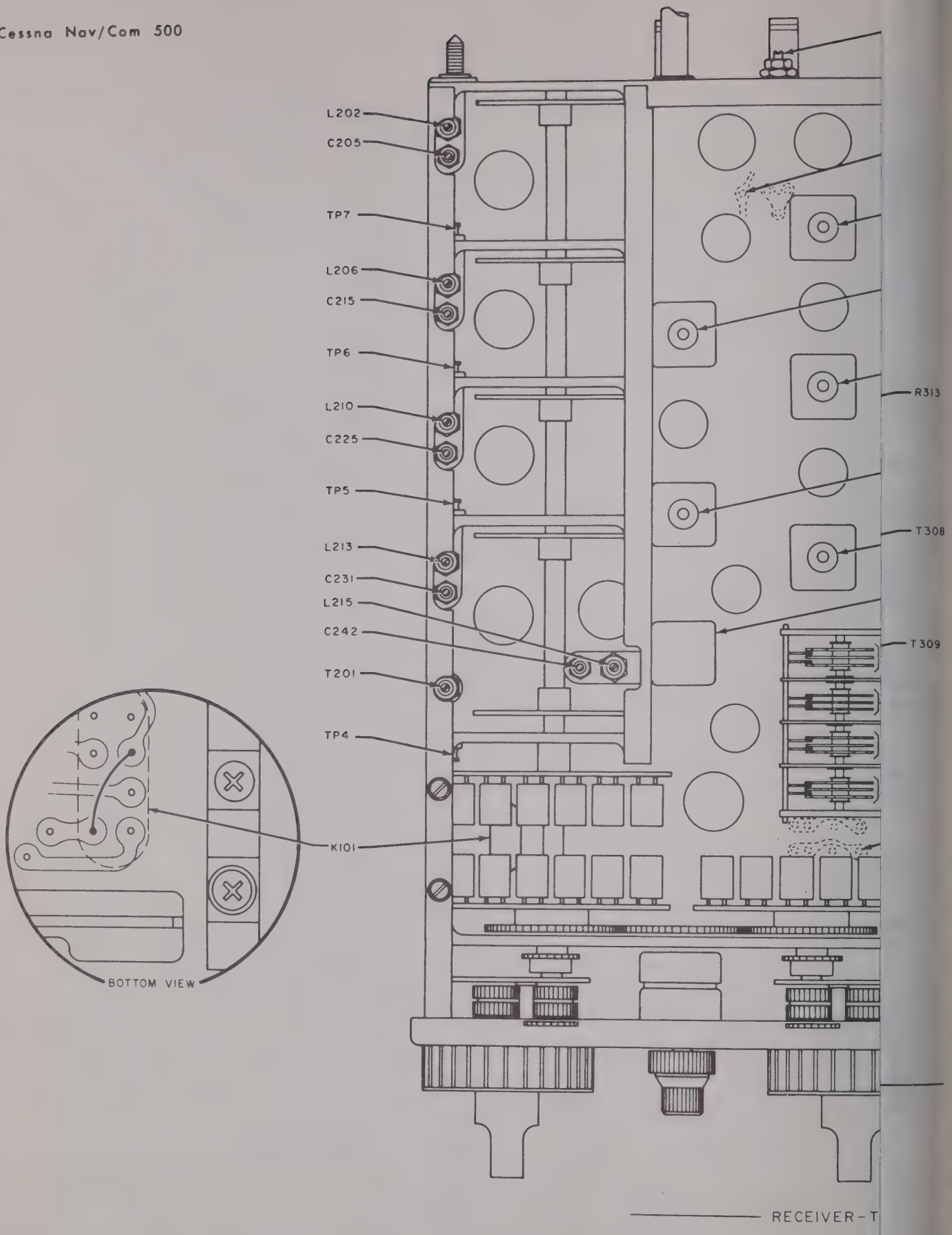


Figure 2-12. Nav/Com 500 Electrical Adjustments

Step 3. Adjust C215 or L206 until a reading is noted on voltmeter. Adjust C205 or L202 until a reading is noted on wattmeter.

Step 4. Tune transmitter to 135.50 mc. Adjust L206 for a peak on the voltmeter and L202 for a peak on the wattmeter. Tune to 118.50 mc. Adjust C215 for a peak on the voltmeter and C205 for a peak on the wattmeter. Continue adjusting L206 and L202 at 135.50 mc and C205 and C215 at 118.50 mc until there is no further peaking required at either alignment position. Typical vtvm readings should be between -50 and -70 volts at either frequency.

Final Alignment. To complete the alignment of the transmitter, peak all stages as follows:

Step 1. Remove shorting wire previously installed between wiper and normally open contact of K101. Set modulated-B+ on-off switch on.

Step 2. Connect d-c probe of Hewlett-Packard Model 410B voltmeter to TP7. Set voltmeter to read -100 volts full scale. Tune transmitter to 118.50 mc. Connect Bird Electronic Model 61 Wattmeter to transmitter output jack J201. Key the transmitter.

Step 3. Adjust C231, C225, and C215 for a peak on the voltmeter. Adjust C205 for a peak on the wattmeter. Tune transmitter to 135.50 mc. Adjust L213, L210, and L206 for a peak on the voltmeter. Adjust L202 for a peak on the wattmeter.

Step 4. Check the power output at 118.00 mc and 135.00 mc. Check the output balance between the .0-mc and the .95-mc positions. If output is not balanced at these end positions, readjust the alignment elements of the driver and power amplifier.

Microphone Amplifier and Modulator.

Step 1. Set modulated-B+ on-off switch on. Key the transmitter.

Step 2. Connect Hewlett-Packard Model 200AB Audio Oscillator into phantom microphone. Adjust audio oscillator output for 1 volt at 1000 cps.

Step 3. Set clipping adjust potentiometer R313, shown in Figure 2-12, fully counterclockwise.

Step 4. Adjust R307, shown in Figure 2-12, so that between 85 and 90 per cent modulation is visible on the Tektronix Model 310 Oscilloscope. Tighten the locknut on R307.

Step 5. Increase output of audio oscillator to 2 volts at 1000 cps. Adjust R313 to prevent modulation from exceeding 100 per cent. Tighten locknut on R313.

Sidetone Adjustment. With the Nav/Com installed in the aircraft and interconnected as shown in Figure 2-15 key the transmitter and adjust sidetone potentiometer R317, shown in Figure 2-12, as desired. Tighten locknut to retain the setting.

RECEIVER ALIGNMENT AND ADJUSTMENT PROCEDURES.

General. The following paragraphs describe adjustment and alignment of the receiver circuits in the Receiver-Transmitter. Except for adjustment of the fractional and whole megacycle switches, the procedures are arranged in the order they should be performed if complete alignment is necessary, though any one of the procedures may be performed individually provided the preliminary procedure is included. In addition to the usual reasons for alignment, alignment may be required as a result of a part replacement. Although only the circuit affected need be aligned, for optimum performance the alignment of related circuits should be checked.

In general the receiver i-f circuits are purposely over-coupled so that a dip in the center of the passband is noticeable. All alignment procedures must be made using this dip as the reference.

For all alignment procedures an audio output load of 300 ohms (non-inductive) must be connected across the phone output and 4 ohms (non-inductive) across the speaker output. Parallel loads must not be connected across either output during audio measurements.

All signal generator outputs are listed in hard* microvolts. With the Boonton Radio Type 505-B 6-db Attenuator, the attenuator dial of the signal generator in use reads hard microvolts directly. Without the 6-db attenuator the attenuator dial reading must be doubled to give the correct hard-microvolt reading.

Receiver Fractional Megacycle Switch. If the Nav/Com has been disassembled, adjust the RCVR FRACT MC switch and the receiver VOR/localizer switch during reassembly as follows:

Step 1. Center rotor contacts of S101B and S101C, and S102B on any of the printed stator contacts. For convenience, any contacts on the top of the switches may be used as long as the contacts on the two switches are mechanically in phase.

Step 2. Mesh idler gear in place.

Step 3. As shown in figure 2-11, rotate idler gear until the rotor contact of S102B is centered on the printed stator contact of the 22.224-mc crystal. Tighten the two setscrews in the gear of the receiver VOR/localizer switches, S101B and S101C.

Step 4. Rotate RCVR FRACT MC knob to center .4 mc in the lower portion of window, then tighten the two setscrews in the knob.

Receiver Megacycle Switch. If the Nav/Com has been disassembled, adjust the RCVR MC switch and gang capacitor during reassembly as follows:

*Hard microvolts are defined as equivalent open-circuit microvolts across a 50 ohm signal source.

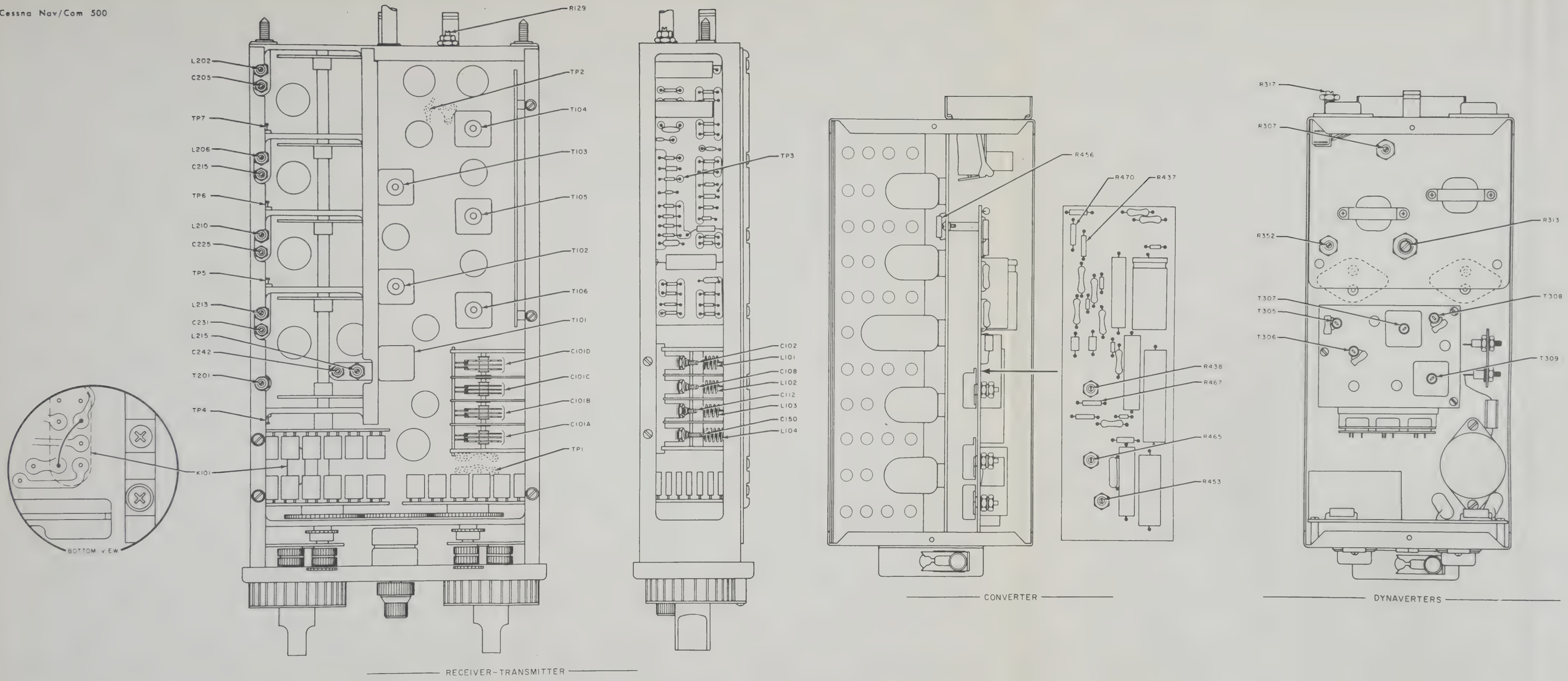


Figure 2-12. Nav/Com 500 Electrical Adjustments

Step 3. Adjust C215 or L206 until a reading is noted on voltmeter. Adjust C205 or L202 until a reading is noted on wattmeter.

Step 4. Tune transmitter to 135.50 mc. Adjust L206 for a peak on the voltmeter and L202 for a peak on the wattmeter. Tune to 118.50 mc. Adjust C215 for a peak on the voltmeter and C205 for a peak on the wattmeter. Continue adjusting L206 and L202 at 135.50 mc and C205 and C215 at 118.50 mc until there is no further peaking required at either alignment position. Typical vtvm readings should be between -50 and -70 volts at either frequency.

Final Alignment. To complete the alignment of the transmitter, peak all stages as follows:

Step 1. Remove shorting wire previously installed between wiper and normally open contact of K101. Set modulated-B+ on-off switch on.

Step 2. Connect d-c probe of Hewlett-Packard Model 410B voltmeter to TP7. Set voltmeter to read -100 volts full scale. Tune transmitter to 118.50 mc. Connect Bird Electronic Model 61 Wattmeter to transmitter output jack J201. Key the transmitter.

Step 3. Adjust C231, C225, and C215 for a peak on the voltmeter. Adjust C205 for a peak on the wattmeter. Tune transmitter to 135.50 mc. Adjust L213, L210, and L206 for a peak on the voltmeter. Adjust L202 for a peak on the wattmeter.

Step 4. Check the power output at 118.00 mc and 135.00 mc. Check the output balance between the .0-mc and the .95-mc positions. If output is not balanced at these end positions, readjust the alignment elements of the driver and power amplifier.

Microphone Amplifier and Modulator.

Step 1. Set modulated-B+ on-off switch on. Key the transmitter.

Step 2. Connect Hewlett-Packard Model 200AB Audio Oscillator into phantom microphone. Adjust audio oscillator output for 1 volt at 1000 cps.

Step 3. Set clipping adjust potentiometer R313, shown in Figure 2-12, fully counterclockwise.

Step 4. Adjust R307, shown in Figure 2-12, so that between 85 and 90 per cent modulation is visible on the Tektronix Model 310 Oscilloscope. Tighten the locknut on R307.

Step 5. Increase output of audio oscillator to 2 volts at 1000 cps. Adjust R313 to prevent modulation from exceeding 100 per cent. Tighten locknut on R313.

Sidetone Adjustment. With the Nav/Com installed in the aircraft and interconnected as shown in Figure 2-15 key the transmitter and adjust sidetone potentiometer R317, shown in Figure 2-12, as desired. Tighten locknut to retain the setting.

RECEIVER ALIGNMENT AND ADJUSTMENT PROCEDURES.

General. The following paragraphs describe adjustment and alignment of the receiver circuits in the Receiver-Transmitter. Except for adjustment of the fractional and whole megacycle switches, the procedures are arranged in the order they should be performed if complete alignment is necessary, though any one of the procedures may be performed individually provided the preliminary procedure is included. In addition to the usual reasons for alignment, alignment may be required as a result of a part replacement. Although only the circuit affected need be aligned, for optimum performance the alignment of related circuits should be checked.

In general the receiver i-f circuits are purposely over-coupled so that a dip in the center of the pass-band is noticeable. All alignment procedures must be made using this dip as the reference.

For all alignment procedures an audio output load of 300 ohms (non-inductive) must be connected across the phone output and 4 ohms (non-inductive) across the speaker output. Parallel loads must not be connected across either output during audio measurements.

All signal generator outputs are listed in hard* microvolts. With the Boonton Radio Type 505-B 6-db Attenuator, the attenuator dial of the signal generator in use reads hard microvolts directly. Without the 6-db attenuator the attenuator dial reading must be doubled to give the correct hard-microvolt reading.

Receiver Fractional Megacycle Switch. If the Nav/Com has been disassembled, adjust the RCVR FRACT MC switch and the receiver VOR/localizer switch during reassembly as follows:

Step 1. Center rotor contacts of S101B and S101C, and S102B on any of the printed stator contacts. For convenience, any contacts on the top of the switches may be used as long as the contacts on the two switches are mechanically in phase.

Step 2. Mesh idler gear in place.

Step 3. As shown in figure 2-11, rotate idler gear until the rotor contact of S102B is centered on the printed stator contact of the 22.224-mc crystal. Tighten the two setscrews in the gear of the receiver VOR/localizer switches, S101B and S101C.

Step 4. Rotate RCVR FRACT MC knob to center .4 mc in the lower portion of window, then tighten the two setscrews in the knob.

Receiver Megacycle Switch. If the Nav/Com has been disassembled, adjust the RCVR MC switch and gang capacitor during reassembly as follows:

*Hard microvolts are defined as equivalent open-circuit microvolts across a 50 ohm signal source.

Step 1. Loosen setscrews in RCVR MC shaft pinion gear. Position stop on capacitor gear against upper stop on capacitor frame. Loosen capacitor gear setscrews and adjust the capacitor rotors until they are fully meshed. Tighten setscrews in capacitor gear.

Step 2. Position stop on the capacitor gear assembly 0.030 ± .003 inch away from upper stop on capacitor frame (see Figure 2-11), then tighten the two setscrews in the pinion gear. This will bring the capacitor slightly out of full mesh.

Step 3. Carefully center the rotor contact on the printed stator contact of the 88.176-mc crystal on S101A; then tighten the two setscrews in the hub.

Step 4. Rotate RCVR MC knob to center 08 in upper portion of window; then tighten the two setscrews in the hub.

Step 5. Rotate RCVR MC knob to center 11 in upper portion of window; then position cam on gang capacitor to just close Micro switch. Tighten two setscrews to secure the cam to the capacitor shaft. When correctly adjusted, Micro switch should remain closed from 08- to 11-mc positions when cam is rotated from either direction. If necessary, adjust Micro switch by loosening mounting screws.

Preliminary Procedure.

Step 1. Interconnect Nav/Com and test equipment as shown in Figure 2-10.

Step 2. Apply rated primary power Nav/Com (13.75 volts dc for 14-volt units and 27.5 volts dc for 28-volt units). Turn test equipment on. Allow at least a 15-minute warm-up period.

455-kc I-f Alignment.

Step 1. Connect d-c probe of Hewlett-Packard Model 410B voltmeter to TP3. Set the voltmeter to read -10 volts full scale.

Step 2. Connect Measurement model 65-B signal generator to the grid (pin 1) of V107. Set signal generator for an output of 400K uv at 460 kc.

Step 3. Place the i-f swamping tool shown in Figure 2-7 across the secondary terminals of T106. Tune the primary (top slug) for maximum reading on the voltmeter.

NOTE

The primary terminals of i-f transformers T104, T105, and T106 are the two eyelets immediately to the rear of the i-f slug holes. The secondary terminals of the transformers are the two eyelets on the front panel side of the slug holes.

Step 4. Set signal generator output to 1 volt and swamp the primary terminals of T106. Tune secondary (bottom slug) for maximum reading on the voltmeter.

NOTE

The bottom slug will tune very broadly, and careful observation may be necessary to identify the peak.

Step 5. Set signal generator for an output of 400K uv at 455 kc. Peak the top slug of T106 without swamping.

Step 6. Set the i-f gain control, R129, maximum clockwise. Repeat Steps 2 and 3, connecting the signal generator to the grid (pin 1) of V106 and tuning T105.

Step 7. Connect the signal generator to the grid (pin 7) of V105. Set signal generator for an output of 400K uv at 455 kc. Swamp the secondard terminals of T104 and peak the primary (top slug). Swamp the primary terminals and peak the secondary.

Step 8. Set signal generator output to 3K uv and adjust R129 to produce -5 volts output on voltmeter.

2.0-mc I-f Alignment.

Step 1. Connect d-c probe of Hewlett-Packard Model 410B voltmeter to TP3. Set the voltmeter to read -10 volts full scale.

Step 2. Connect measurements model 65-B signal generator to the grid (pin 1) of V104. Set signal generator for an output of 400K uv at 2.0 mc.

Step 3. Place the i-f swamping tool shown in Figure 5-1 across the secondary terminals of T103. Tune the primary (top slug) for maximum reading on the voltmeter; then, detune the primary terminals and tune the secondary.

NOTE

The primary terminals of i-f transformers T102 and T103 are the two eyelets immediately on the front panel side of the slug holes. The secondary terminals of the transformers are the two eyelets to the rear of the slug holes.

Step 4. Connect signal generator to grid (pin 2) of V103A. Repeat Step 3 substituting T102 tor T103.

Fractional Megacycle Oscillator Check. The fractional oscillator is normally aligned as part of the transmitter. Any changing of the fractional oscillator tuning during receiver alignment will require a recheck of transmitter operation. The check is included, here, and should be performed only as part of a complete realignment of the receiver.

Step 1. Connect a-c probe of a Hewlett-Packard Model 410B voltmeter to the grid (pin 2) of V103A. Set the voltmeter to read 3 volts ac full scale.

Step 2. Set RCVR FRACT MC knob to each fractional megacycle position. Output as noted on

voltmeter should be at least 1 volt ac for each position.

I-f Filter. I-f filter T101 must not be aligned in the field. Any attempt to align the filter while it is installed in the receiver will result in a drastic reduction in receiver sensitivity. Since proper operation of T101 is essential to the correct alignment of the associated circuits, check for correct operation as follows:

Step 1. Connect Ballantine model 300 voltmeter across loudspeaker terminals.

Step 2. Connect measurements model 65-B signal generator to grid (pin 1) of V102. Tune signal generator to 19.824 mc with an output of approximately 20 uv modulated 50 per cent at 1000 cps. Set RCVR FRACT MC knob to .0 mc.

Step 3. Adjust receiver VOL control to obtain a convenient reading such as 3 volts on the voltmeter.

Step 4. Set RCVR FRACT MC knob to .5 mc. Tune signal generator to 20.324 mc while holding output level constant. The voltage should be within ±3 db of reference level of Step 3.

Step 5. Set RCVR FRACT MC knob to .95 mc and tune signal generator to 20.774 mc. The output voltage should be within ±3 db of reference level of Step 3.

Receiver Megacycle Oscillator.

NOTE

All shields must be in place before proceeding with alignment and adjustment of the megacycle oscillator.

Step 1. Set RCVR MC knob to 108 mc. Check that the crystal contact is centered on the printed stator contact of the 88.176-mc crystal and that the tuning capacitor plates are slightly out of full mesh. Set RCVR MC knob to 126 mc and check that the crystal contact is centered on the printed stator contact of the 106.176-mc crystal, and the capacitor plates are almost out of mesh. If either of these conditions is not met, readjust the mechanical alignment of the RCVR MC knob, as outlined previously in this section.

Step 2. Connect d-c probe of a Hewlett-Packard model 410B voltmeter to TP1. Set voltmeter to read 1 volt full scale.

Step 3. Set RCVR MC knob to 126 mc and adjust C150 for a peak reading on the voltmeter.

Step 4. Set RCVR MC knob to 108 mc. Insert brass or iron end of tuning wand into L104. If the brass end of the tuning wand causes the vtvm reading to increase, spread turns of L104 until peak output is obtained. If iron end of tuning wand causes output to increase, compress turns of L104 until peak output is obtained.

Step 5. Repeat Steps 3 and 4 until peak adjustment is obtained at 108- and 126-mc positions.

Step 6. Set RCVR MC knob successively to frequencies 108 through 126 mc. Using the tuning wand, check for peak output at each frequency. The output at each frequency should be within 5 per cent of the peak at normal factory adjustment. Severe deviation from this requirement can only be corrected by adjustment of the serrated rotor plates in the oscillator section of the tuning capacitor. This adjustment should be made only by qualified technicians using standard methods.

Step 7. After obtaining peak readings throughout the oscillator tuning range, reinstall top shield screen and set RCVR MC knob to 126 mc. Turn C150 counterclockwise (reducing capacity) until the vtvm reading drops at least 10 per cent.

Step 8. Set RCVR MC knob to 108 mc and spread turns of L104 until vtvm reading is 90 per cent of the peak reading of Step 6.

Step 9. Check steps 7 and 8 by inserting the iron tip of a tuning wand into L104. Output should increase as the tuning wand is inserted. If necessary, repeat steps 7 and 8.

Step 10. At each position of RCVR MC knob note the reading on the voltmeter; reading should be greater than 0.2 volt.

Step 11. Set RCVR MC knob to each mc position and insert the iron tip of a tuning wand into L104. At every position the oscillator output should be at least 10 per cent above the reading noted in Step 10. If necessary, readjust C150 or L104, or both, until this requirement is met.

NOTE

Detuning of the receiver megacycle oscillator on the high-frequency side of peak is necessary to ensure stable operation. This is due to the inherent characteristic of a crystal-controlled grounded-grid oscillator which exhibits a sharp drop-off characteristic on the low-frequency side of peak. Tuning on peak or on the low-frequency side of peak can result in intermittent oscillator output under environmental conditions.

Step 12. Connect a-c probe of Hewlett-Packard model 410B voltmeter to the cathode (pin 7) of V102. Read a-c voltage at each position of the RCVR MC knob. Voltage reading should be 0.9 volt minimum.

R-f Circuits.

Step 1. Tune receiver to 126.50 mc. Connect a 22-uuf capacitor between the stator of the r-f plate section of C101C and ground.

Step 2. Connect a Boonton Radio Type 211-A signal generator to receiver antenna input J101. Tune signal generator to 126.50 mc.

Step 3. Connect d-c probe of a Hewlett-Packard model 410B voltmeter to TP3. Set voltmeter to read -10 volts full scale. Tune signal generator for pass-band dip as indicated on voltmeter.

Step 4. Adjust trimmers C102 and C112 for maximum output on the voltmeter. When peak tuning is reached, tune receiver and signal generator to 108.50 mc and adjust coils L101 and L103 for maximum output on voltmeter. Repeat the trimmer adjustments at 126.50 mc and the coil adjustments at 108.50 mc until no further improvement is obtained.

Step 5. Disconnect the 22-uuf capacitor and reconnect it between the stator of the mixer grid section, C101B, and ground.

Step 6. Tune receiver and signal generator to 126.50 mc. Adjust trimmer C108 for maximum output as indicated at TP3. When peak tuning is reached, switch receiver and signal generator to 108.50 mc and adjust coil L102 for maximum output. Readjust C108 at 126.50 mc and L102 at 108.50 mc until no further improvement can be obtained.

Step 7. Remove 22-uuf capacitor and peak the mixer grid trimmer, C112, for maximum output at 126.95 mc.

30-cps Phase Shift. The 30-cps phase shift of the receiver has been determined and adjusted accurately at the factory. Replacement of T106, R135, C147, R136, R137, C149, C175, R173, R164, or CR101 may change the phase shift, in which case the receiver should be readjusted at the factory. However, if the receiver cannot be returned to the factory, adjust the phase shift as follows:

Step 1. Set indicator CRS SEL to exactly 0.

Step 2. Connect an ARC Type H14-A signal generator through a 6-db attenuator to the receiver antenna input, J101. Adjust the H-14A for a 114.90-mc, 0° ANGLE "TO," OMNI modulation signal. Set H-14A ATTENUATOR control to 100 uv.

Step 3. Adjust values of R135 and R173 until a 0° ± 1/2-dot reading is noted on indicator.

Step 4. While observing the vertical pointer, vary H-14A output from 100 uv to 10,000 uv. The pointer should not move more than one pointer width.

I-f Gain Adjustment.

Step 1. Connect an ARC Type H-14A signal generator through a 6-db attenuator to the receiver antenna input, J101. Adjust the H-14A for a 114.90-mc, 0° ANGLE "TO," OMNI modulation signal. Set H-14A ATTENUATOR control to 3 uv.

Step 2. Adjust R129 so that the OFF section of OFF/TO-FROM meter just starts to show.

Audio Output Level. The audio output of the Nav/Com may be set to a desired level by adjusting R352. This control, installed in M-1 and later units, is accessible after removing the button plug on top of the dynaverter.

CONVERTER ALIGNMENT AND ADJUSTMENT PROCEDURES.

General. The following paragraphs describe the adjustment and alignment procedures for the converter. The test equipment required to perform the procedures is listed in the test equipment table. Interconnections between units of the converter and test equipment are shown in Figure 2-10. Adjustment points mentioned in the procedures are illustrated in Figure 2-12. Input voltage to the Nav/Com should be 13.75 volts for 14-volt units and 27.5 volts for 28-volt units. Allow at least a 15-minute warm-up period.

Coupling of H-14A to Nav/Com. Either the RF OUTPUT or the DEMOD output from the H-14A signal generator may be used to align the converter. If the RF OUTPUT is used, the signal injection point is the receiver input connector. Under this condition, proper operation of the receiver should be verified before aligning the converter as follows:

Step 1. Channel the receiver to 114.90 mc. Set H-14A crystal switch MC to B (114.90 mc). Set the H-14A MODULATION switch to 30~ and adjust ATTENUATOR for an output of 100 uv.

Step 2. Connect a Ballantine model 300 voltmeter between pin 3 of J401 and ground. Set voltmeter to read 10 volts full scale. Voltmeter should read 1.8 ± 0.2 volt.

Step 3. Set the H-14A MODULATION switch to 9960~. Voltmeter should read 1.8 ± 0.2 volt.

Step 4. Channel receiver to 110.90 mc. Set H-14A crystal switch MC to A (110.90 mc). Set the H-14A MODULATION switch to 90~ and adjust ATTENUATOR for an output of 1000 uv. Voltmeter should read 1.3 ± 0.4 volt.

Step 5. Set the H-14A MODULATION switch to 150~. Voltmeter should read 1.3 ± 0.2 volt.

If the DEMOD output from the Type H-14A is used for alignment, all the receiver circuits are bypassed and the signal is injected directly into the navigation input (pin 3) of J401. Under this condition the phase of the 30-cps navigation output from the receiver leads the phase of the input modulation envelope by 191.5° when the receiver navigation output line is open-circuited. This phase shift is factory adjusted during manufacture and must be considered whenever the converter is tested or aligned as a separate unit.

When the converter is fed directly from the DEMOD output of the Type H-14A during course accuracy checks, on-course indications should be obtained when the reading on the indicator is 191.5° greater than the ANGLE "TO," setting of the H-14A OMNI TRACK switch; that is, for an omni track of 0°, an on-course indication should correspond to an indicator reading of 191.5° TO; for a 300° track, an on-

course indication should be obtained at 131.5° (491.5° − 360°); and similarly for other courses. The reason for this difference is that the open-circuit phase of the H-14A DEMOD output is 191.5° behind the corresponding receiver output phase. Therefore, the course indicator must be rotated to advance the phase by 191.5° in the converter. A perfect converter should produce on-course indications on the vertical pointer meter whenever the TO reading of the OFF/TO-FROM meter is 191.5° greater than the setting of the H-14A OMNI TRACK switch.

Preliminary Procedure.

Step 1. Interconnect the Nav/Com and test equipment as shown in Figure 2-10.

Step 2. Apply power to the units (13.75 volts for 14-volt units or 27.5 volts for 28-volt units). Allow at least a 15-minute warm-up period.

NOTE

It is assumed that all electron tubes have been tested prior to alignment. Defective tubes should be replaced and good tubes returned to their original sockets.

VOR Course Accuracy.

Step 1. Connect RF OUTPUT of H-14A signal generator to the receiver antenna input connector, J101. Channel to 114.90 mc. Set H-14A crystal switch MC to B (114.90 mc). Set H-14A MODULATION switch to OMNI and ATTENUATOR to 100 uv.

Step 2. Set H-14A OMNI TRACK switch to 0°. Rotate CRS SEL pointer to 0°. Adjust VOR balance adjustment R438 until vertical pointer is centered.

Step 3. Set H-14A OMNI TRACK switch to 180°. Adjust VOR balance adjustment R438 to reduce the off-course indication by one-half.

Step 4. Repeat steps 2 and 3 until an on-course indication is obtained at 0° and 180°.

VOR Course Width.

Step 1. Connect RF OUTPUT of H-14A signal generator to receiver antenna input J101. Channel to 114.90 mc. Set H-14A crystal switch MC to B (114.90 mc). Adjust for 30 per cent modulation of 30 cps and 9960 cps, then set H-14A MODULATION switch to OMNI, OMNI TRACK to 0°, and ATTENUATOR to 100 uv.

Step 2. Rotate CRS SEL for a "5 dot to the left" vertical pointer deflection. Note reading of course selector pointer.

Step 3. Rotate CRS SEL for a "5 dot to the right" vertical pointer deflection. Note reading of course selector pointer.

Step 4. The difference between the reading obtained in Step 2 and the reading of Step 3 should be 20 ± 1°. If necessary, adjust value of R456 to produce the desired difference between the readings.

VOR OFF/TO-FROM Adjustment.

Step 1. Connect the RF OUTPUT of the H-14A signal generator to the receiver antenna input connector, J101. Channel to 114.90 mc. Set H-14A crystal switch MC to B (114.90 mc). Adjust for 30 per cent modulation of 30 cps and 9960 cps. Then set H-14A MODULATION to OMNI, OMNI TRACK to 0°, and ATTENTUATOR to 100 uv. OFF/TO-FROM meter should indicate TO.

Step 2. Set the H-14A MODULATION switch to 9960~ (30-cps modulation off); all or some of the OFF part of the OFF/TO-FROM meter should show.

Step 3. Set H-14A MODULATION switch to 30~ (9960-cps modulation off). All or some of the OFF part of the OFF/TO-FROM meter should show.

Step 4. Reduce 30-cps and 9960-cps modulations to 15 per cent; then set MODULATION switch to OMNI. All or some of the OFF part of the OFF/TO-FROM meter should show. Increase 30-cps and 9960-cps modulations to normal level.

Step 5. Reduce H-14A ATTENUATOR to 10 uv. OFF/TO-FROM meter should indicate TO.

Step 6. If necessary, adjust VOR flag current by changing the value of R437 within the limits of 470 to 820 ohms.

Localizer Centering.

Step 1. Connect the RF OUTPUT of the H-14A signal generator to the receiver antenna input connector. Channel to 110.90 mc. Set H-14A crystal switch MC to A (110.90 mc). Set H-14A MODULATION switch to AMP LOC ⊕ (pointer center), and ATTENUATOR to 100 uv.

Step 2. The vertical pointer should be centered. If necessary, adjust localizer balance R456 to center vertical pointer.

Localizer Course Sensitivity.

Step 1. Connect the RF OUTPUT of the H-14A signal generator to the receiver antenna input connector. Channel to 110.90 mc. Set H-14A crystal switch MC to A (110.90 mc). Set H-14A MODULATION switch to AMP LOC ⊘ (pointer left), and ATTENUATOR to 100 uv. Vertical pointer should deflect approximately three dots ±1/4 dot to the left.

Step 2. Set the H-14A MODULATION switch to AMP LOC ⊘ (pointer right). Vertical pointer should deflect approximately three dots ± 1/4 dot to the right.

Step 3. If necessary, adjust localizer sensitivity by changing the value of R467 within the limits of 1800 to 6800 ohms.

Localizer Flag Sensitivity.

Step 1. Connect the RF OUTPUT of the H-14A signal generator to the receiver antenna input connector. Channel to 110.90 mc. Set H-14A crystal switch MC to A (110.90 mc). Set H-14A MODULATION switch to AMP LOC ⊕ (pointer center) and ATTENUATOR to 1000 uv.

Step 2. Reduce 90-cps modulation to zero; all or some of the OFF part of the OFF/TO-FROM meter should show. Restore normal 90-cps modulation.

Step 3. Reduce 150-cps modulation to zero; all or some of the OFF part of the OFF/TO-FROM meter should show. Restore normal 150-cps modulation.

Step 4. With the standard localizer signal output, reduce H-14A ATTENUATOR to 40 uv; OFF portion of OFF/TO-FROM meter should not show.

Step 5. If necessary, adjust localizer flag current by changing the value of R470 within the limits of 1K to 30K ohms.

DYNAVERTER ALIGNMENT AND ADJUSTMENT PROCEDURE.

General. The following paragraph describes the adjustment and alignment of the marker beacon receiver circuit in the dynaverter. Required test equipment is listed in test equipment table. Bench test interconnections are shown in Figure 2-10. Adjustment points mentioned are illustrated in Figure 2-12.

In both dynaverters, since microphone gain potentiometer R307, clipping level potentiometer R313, and sidetone potentiometer R317 are functionally related to the transmitter, adjustment of these controls is described as part of the transmitter alignment procedures included previously. In addition, audio output level adjustment R352 is described as part of the receiver alignment procedures.

Marker Beacon Receiver. The marker beacon receiver contained in the dynaverter is adjusted and aligned as follows:

Step 1. Interconnect the Nav/Com and test equipment as shown in Figure 2-10. Apply power to the units (13.75 volts for 14-volt units or 27.5 volts for 28-volt units). Allow at least a 15-minute warm-up period.

Step 2. Using the crystal calibrator in the Hewlett-Packard model 608D signal generator, tune the model 608D to 75 mc. Adjust the Model 608D and the Hewlett-Packard model 200AB audio oscillator for 95 per cent modulation at 3000 cps. Adjust the output of the model 608D to stay well below lamp-operate sensitivity (the magnitude of input signal that would light the white, 3000-cps lamp).

Step 3. Connect a ballantine model 300 voltmeter between pin 1 of the connector on the rear of the dynaverter and ground.

Step 4. Adjust the slug of T309 and then the slug of T307 for maximum output on the voltmeter.

Step 5. Adjust the slug of T308 for maximum audio output; then turn the slug in one full turn.

Step 6. Adjust the slug of T306 for maximum audio output.

Step 7. Disconnect the model 608D. Connect the Boonton Radio model 90C RF voltmeter to the marker beacon antenna connector, J303. Adjust oscillator trap T305 for minimum oscillator radiation.

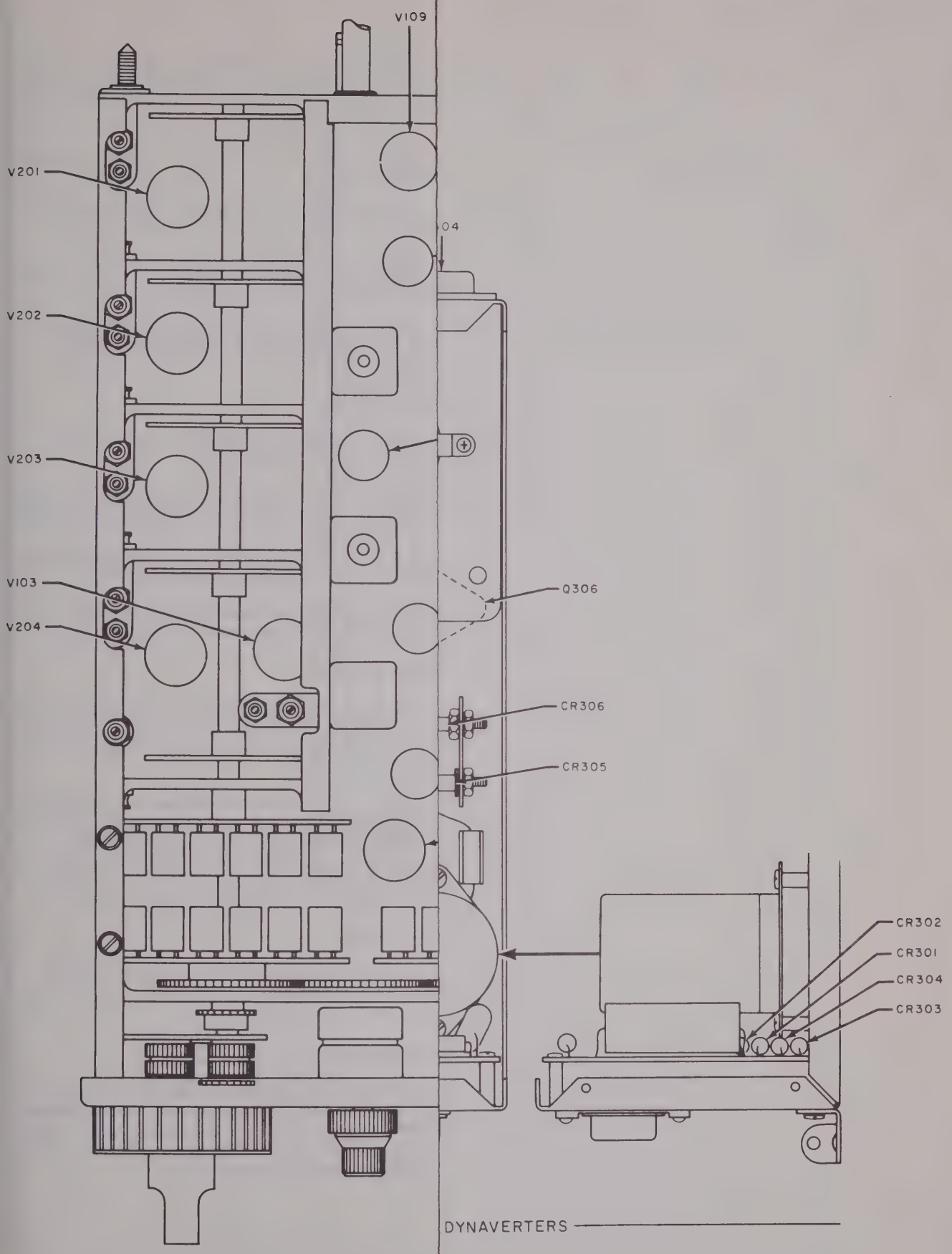
REMOVAL AND REPLACEMENT PROCEDURES.

General. The following paragraphs describe the mechanical procedures necessary to maintain the receiver-transmitter. Obvious procedures evident in Figure 2-26 or from inspection of the unit are omitted.

Electron Tubes. A total of 18 plug-in electron tubes are used in the Nav/Com. The 13 tubes in the panel unit are accessible after the unit is removed from its mounting and the top shield screen is removed from the unit. The five tubes in the converter are accessible after the dust cover is removed. Tube locations are shown in Figure 2-13. If the tubes are removed for testing, replace all tubes testing "good" in the location from which they were removed. Check all new tubes for proper performance before installation.

Semiconductor Devices. As shown in Figure 2-13 the panel unit, converter and dynaverter contain semiconductor devices. If replacement of a crystal diode is required, the new crystal diode must be correctly polarized and its leads routed as nearly as possible like the original installation. When soldering replacement semiconductors, hold the lead with a pair of pliers between the solder joint and the diode. The pliers form a heat sink which prevents excessive heat from damaging the diode. Do not remove the pliers until the heat from the solder joint has been dissipated.

Quartz Crystals. As shown in Figure 2-17, 58 quartz crystals are used in the Nav/Com. The quarts crystals are soldered directly into eyelets on one of three printed-circuit boards. Since the printed-circuit boards are mounted vertically, certain crystals are less accessible than others. Therefore, it is necessary to partially disassemble the unit to gain access to the crystals located on the inside rows, closest to the main printed-circuit board. When soldering a crystal, hold the crystal pin(s) with a pair of pliers between the solder joint and the crystal. The pliers form a heat sink which prevents excessive heat from damaging the diode. Do not remove the pliers until the heat from the solder joint has been dissipated.



13. Electron Tube and Semiconductor Location Diagram

Localizer Flag Sensitivity.

Step 1. Connect the RF OUTPUT of the H-14A signal generator to the receiver antenna input connector. Channel to 110.90 mc. Set H-14A crystal switch MC to A (110.90 mc). Set H-14A MODULATION switch to AMP LOC ⊕ (pointer center) and ATTENUATOR to 1000 uv.

Step 2. Reduce 90-cps modulation to zero; all or some of the OFF part of the OFF/TO-FROM meter should show. Restore normal 90-cps modulation.

Step 3. Reduce 150-cps modulation to zero; all or some of the OFF part of the OFF/TO-FROM meter should show. Restore normal 150-cps modulation.

Step 4. With the standard localizer signal output, reduce H-14A ATTENUATOR to 40 uv; OFF portion of OFF/TO-FROM meter should not show.

Step 5. If necessary, adjust localizer flag current by changing the value of R470 within the limits of 1K to 30K ohms.

DYNAVERTER ALIGNMENT AND ADJUSTMENT PROCEDURE.

General. The following paragraph describes the adjustment and alignment of the marker beacon receiver circuit in the dynaverter. Required test equipment is listed in test equipment table. Bench test interconnections are shown in Figure 2-10. Adjustment points mentioned are illustrated in Figure 2-12.

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Step 5. Adjust the slug of T308 for maximum audio output; then turn the slug in one full turn.

Step 6. Adjust the slug of T306 for maximum audio output.

Step 7. Disconnect the model 608D. Connect the Boonton Radio model 90C RF voltmeter to the marker beacon antenna connector, J303. Adjust oscillator trap T305 for minimum oscillator radiation.

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General. The following paragraphs describe the mechanical procedures necessary to maintain the receiver-transmitter. Obvious procedures evident in Figure 2-26 or from inspection of the unit are omitted.

Electron Tubes. A total of 18 plug-in electron tubes are used in the Nav/Com. The 13 tubes in the panel unit are accessible after the unit is removed from its mounting and the top shield screen is removed from the unit. The five tubes in the converter are accessible after the dust cover is removed. Tube locations are shown in Figure 2-13. If the tubes are removed for testing, replace all tubes testing "good" in the location from which they were removed. Check all new tubes for proper performance before installation.

Semiconductor Devices. As shown in Figure 2-13 the panel unit, converter and dynaverter contain semiconductor devices. If replacement of a crystal diode is required, the new crystal diode must be correctly polarized and its leads routed as nearly as possible like the original installation. When soldering replacement semiconductors, hold the lead with a pair of pliers between the solder joint and the diode. The pliers form a heat sink which prevents excessive heat from damaging the diode. Do not remove the pliers until the heat from the solder joint has been dissipated.

Quartz Crystals. As shown in Figure 2-17, 58 quartz crystals are used in the Nav/Com. The quarts crystals are soldered directly into eyelets on one of three printed-circuit boards. Since the printed-circuit boards are mounted vertically, certain crystals are less accessible than others. Therefore, it is necessary to partially disassemble the unit to gain access to the crystals located on the inside rows, closest to the main printed-circuit board. When soldering a crystal, hold the crystal pin(s) with a pair of pliers between the solder joint and the crystal. The pliers form a heat sink which prevents excessive heat from damaging the diode. Do not remove the pliers until the heat from the solder joint has been dissipated.

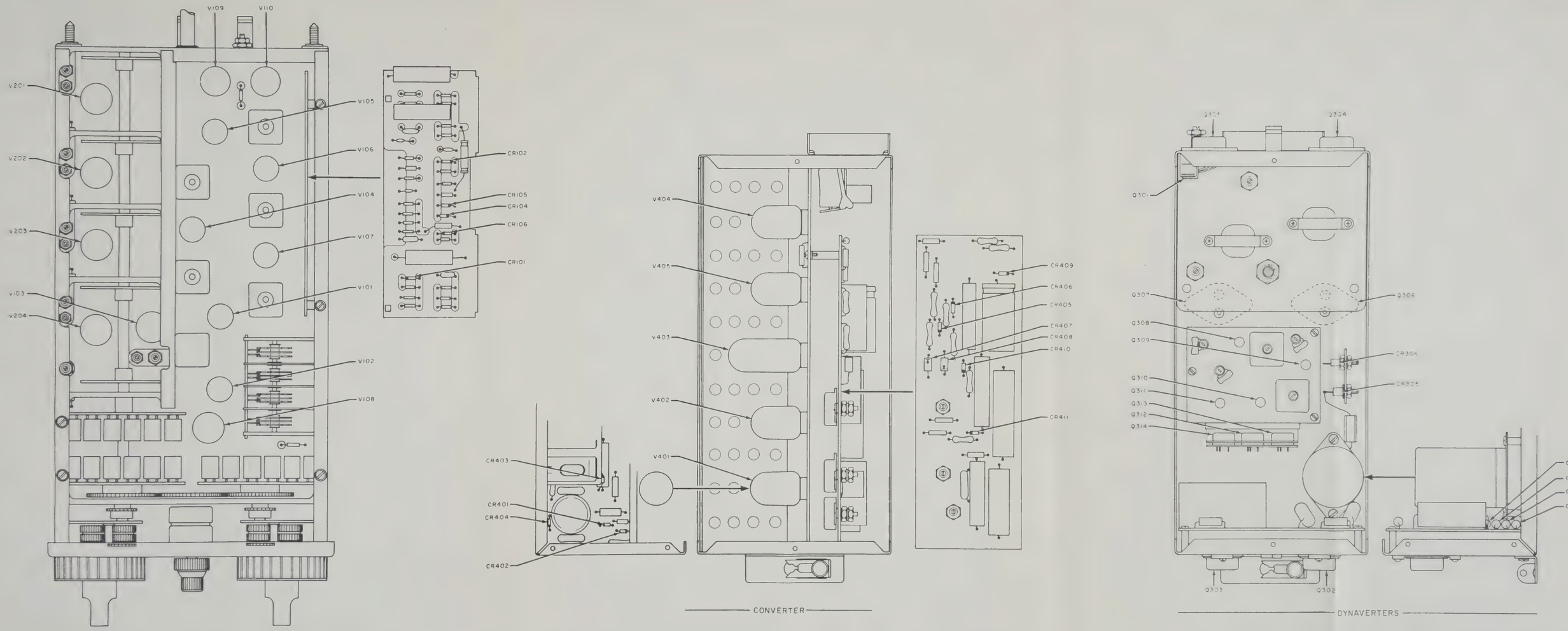


Figure 2-13. Electron Tube and Semiconductor Location Diagram

Knobs and Front Plate.

Step 1. Note TRANS FRACT MC frequency and then remove screw (2, Figure 2-26) and loosen setscrews (3). Slide knob assembly (1) from shaft.

Step 2. Note TRANS MC frequency and then loosen setscrews (5) and slide dial (4) from shaft.

Step 3. Note RCVR FRACT MC and RCVR MC frequencies. Loosen setscrews (15 and 17), remove screw (14), and slide knob assembly (13) and dial (16) from shaft.

Step 4. Loosen setscrews (9, 7, and 11) and remove SQUELCH (8), MKR (6), and VOL (10) knobs.

Step 5. Remove four screws (19) and then detach front plate assembly (18).

Step 6. To reassemble, fasten front plate assembly to panel unit and then replace TRANS MC and RCVR MC dials at the same setting at which they were removed. Replace TRANS FRACT MC and RCVR FRACT MC knob assemblies at the same settings at which they were removed. Reinstall SQUELCH, MKR, and VOL knobs.

Panel Lamps. Two midget, flange-base panel lamps are used in the receiver-transmitter. Replace either of these lamps as follows:

Step 1. Remove the knobs and front plate from the panel unit.

Step 2. Unscrew collar (56, Figure 2-26) and lift lamp (55) from lampholder (57).

Step 3. Replace the defective lamp, seating the flange of the replacement lamp firmly in the lampholder. Reinstall the collar and screw it in finger-tight.

Step 4. Reinstall the front plate and knobs.

Panel Assembly.

Step 1. Remove the front plate and knobs.

Step 2. Remove four screws (21, figure 2-26). Loosen two setscrews (22) in gear assembly (81), two setscrews (22) in hub (79), two setscrews (22) in hub (91), and two setscrews (22) in hub (104). Loosen two setscrews (23) in spur gear (68) and one setscrew (23) in sleeve (109).

Step 3. Separate panel assembly (20) from frame. Lift spur gear (68) from shaft.

Step 4. Disassemble panel assembly as necessary. (See Figure 2-26.)

Step 5. To reassemble and reinstall panel assembly, reverse the procedure outlined in Steps 1 through 4.

Crystal Boards. The following procedure for removal of crystal board (73, Figure 2-26) is typical and may be used as reference for removal of crystal boards (84) and (99).

Step 1. Remove the knobs, front plate and panel assembly.

Step 2. Remove screws (74), (75), (76), and washer (77). Lift crystal board (73) from frame.

Step 3. If necessary, disassemble the crystal board as shown in the illustration.

Step 4. To reassemble and reinstall crystal board, reverse the procedure outlined in Steps 1 through 3.

Gang Capacitor.

Step 1. Remove screws (123, Figure 2-26), (124), (125), and washers (126).

Step 2. Loosen two setscrews (23) in spur gear (68) and slide gang capacitor back and out of frame.

Step 3. Disassemble gang and related parts as necessary (refer to detail A, Figure 2-26).

Step 4. To reassemble gang and reinstall, reverse the procedure outlined in Steps 1 through 3.

Inductor Boards.

Step 1. Loosen 10 setscrews (112, Figure 2-26) and three setscrews (110). Slide shaft (111) through hole in rear of frame. Grasp sleeve (109) as it slides off shaft (111).

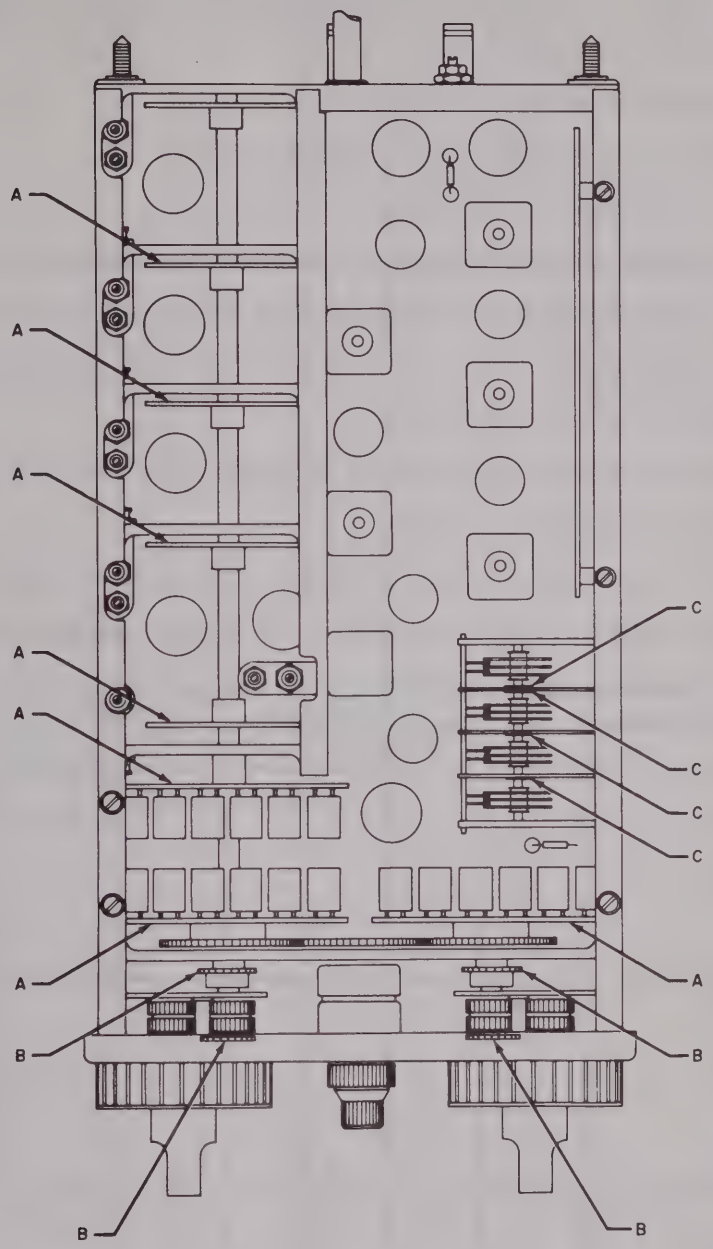
Step 2. Remove the two inductor-board retaining screws used to fasten the inductor board to the frame. To remove boards (116) remove screws (117) and washers (118). To remove board (113A) remove screws (114) and washers (115). To remove board (119) remove screws (120) and washers (121).

LUBRICATION.

Lubricate the receiver-transmitter as directed in Figure 2-14. Remove all traces of old lubricant before applying new lubricant.

MEASUREMENTS.

Typical voltage and resistance measurements for the receiver-transmitter, the converter, and dynaverter, are listed in the voltage and resistance tables. Typical stage gain measurements for the receiver circuit are listed in stage gain table.



Point of Lubrication	Part to be Lubricated	Lubrication Period	Kind of Lubricant	Method of Application
A	Printed Circuit Assembly	500 hours	Dow-Corning DC-510 Silicone Fluid	Apply a small amount to both sides of printed circuit switches with artist's brush.
B	Detent Gear	500 hours	Aeroshell No. 7 Grease	Apply a small amount to each detent gear with artist's brush.
C	Capacitor Grounding Contacts	500 hours	Dow-Corning DC-510 Silicone Fluid.	Apply a small amount to shaft contact.

Figure 2-14. Receiver-Transmitter, Lubrication Diagram

RECEIVER-TRANSMITTER VOLTAGE AND RESISTANCE MEASUREMENTS

Conditions:

1. Units connected as shown in Figure 2-15.
2. Receiver and transmitter channeled to 118.0 mc.
3. Voltage values are approximate and are based on the following:
   a. Values are with respect to chassis ground.
   b. Input voltage set to 13.75 (for 14-volt units) or 27.5 (for 28-volt units).
   c. Hewlett-Packard Model 410B Vacuum Tube Voltmeter used for measurements.
   d. No. r-f signal input under receive condition; no r-f carrier modulation under transmit condition.
   e. SQUELCH control fully counterclockwise.
4. Resistance values are approximate and are based on the following:
   a. Panel units disconnected from other units.
   b. Values are in ohms with respect to chassis ground. Multipliers: K = 1000, M = 1,000,000.
   c. Hewlett-Packard Model 410B Vacuum Tube Voltmeter used for measurements.

Test Point		D-c Voltage		
Tube	Pin	Receive	Transmit	Resistance (ohms)
V101	1	0.5	-1.0	700K
R-f Amplifier	2	1.5	0.0	180
(5654)	3	6.3	6.3	2.1
	4	12.6	12.6	2.0
	5	200.0	0.0	∞
	6	88.0	0.5	100K
	7	1.5	0.0	180
V102	1	0.5	-1.0	600K
First Mixer	2	3.3	0.0	1.2K
(5654)	3	6.3	6.3	2.0
	4	12.6	12.6	2.0
	5	100.0	0.0	95K
	6	90.0	0.0	120K
	7	3.3	0.0	1.2K
V103	1	220.0	0.0	∞
Second Mixer	2	0.0	0.0	0.1
and Transmitter	3	7.2	0.0	2.2K
Megacycle Oscillator	4	12.6	12.6	1.9
(6922)	5	6.3	6.3	4.0
	6	-1.4	50.0	∞
	7	0.0	-1.4	4.7K
	8	0.0	0.0	0
	9	0.0	0.0	0
V104	1	0.5	-1.0	340K
I-f Amplifier	2	0.0	0.0	0
(5749)	3	6.3	6.3	4.2
	4	12.6	12.6	2.0
	5	95.0	0.0	95K
	6	95.0	0.0	95K
	7	4.2	0.0	820

RECEIVER-TRANSMITTER VOLTAGE AND RESISTANCE MEASUREMENTS - Continued

Test Point Tube	D-c Voltage Pin	Receive	Transmit	Resistance (ohms)
V105 Converter (5750)	1	-4.2	0.0	12K
	2	2.5	0.0	680
	3	12.6	12.6	2.0
	4	6.3	6.3	2.4
	5	270.0	0.0	∞
	6	48.0	0.0	∞
	7	0.0	0.0	2.9
V106 455-kc I-f Amplifier (5749)	1	0.5	-1.0	350K
	2	0.0	0.0	0
	3	6.3	6.3	2.2
	4	0.0	0.0	0
	5	93.0	0.0	90K
	6	93.0	0.0	90K
	7	2.9*	0.0	270-5K*
V107 455-kc I-f Amplifier (5749)	1	0.0	0.0	22
	2	0.0	0.0	0
	3	6.3	6.3	2.0
	4	0.0	0.0	0
	5	276.0	0.0	∞
	6	104.0	0.0	90K
	7	3.3	0.0	390
V108 Fractional Megacycle Oscillator and Receiver Megacycle Oscillator (5670)	1	6.3	6.3	1.9
	2	0.0	0.0	0
	3	-0.8	-0.1	5.5K
	4	80.0	0.0	100K
	5	0.0	0.0	0
	6	130.0	125.0	∞
	7	-3.7	-3.5	100K
	8	0.0	0.0	0.3
	9	12.6	12.6	2.0
V109 Second Audio Amplifier and Navigation Cathode Follower (5814)	1	278.0	0.0	∞
	2	0.0	0.0	400K
	3	11.0	0.0	1.5K
	4	12.6	12.6	2.0
	5	0.15	0.15	3.7
	6	280.0	0.0	∞
	7	13.0	0.0	750K
	8	29.0	0.0	22K
	9	6.3	6.3	5.4
V110 First Audio Amplifier and Squelch Control (5751)	1	170.0	0.0	∞
	2	104.0	0.0	640K
	3	106.0	0.0	96K
	4	0.0	0.0	0
	5	0.0	0.0	0
	6	103.0	0.0	420K
	7	5.4	0.0	600K
	8	15.0	0.0	6.8K - 16K+
	9	6.3	6.3	1.9

RECEIVER-TRANSMITTER VOLTAGE AND RESISTANCE MEASUREMENTS - Continued

Test Point		D-c Voltage		Resistance (ohms)
Tube	Pin	Receive	Transmit	
V201	1	0.0	5.9	100
Power Amplifier	2	0.0	-30.0	18K
(5686)	3	0.0	5.9	100
	4	6.3	6.3	3.7
	5	12.6	12.6	1.9
	6	-1.5	265.0	∞
	7	-1.5	270.0	∞
	8	0.0	5.9	100
	9	-1.5	265.0	∞
V202	1	0.0	5.6	100
Driver	2	0.0	-2.6	3.6K
(5686)	3	0.0	5.6	100
	4	0.15	0.15	3.6
	5	6.3	6.3	3.7
	6	0.0	245.0	∞
	7	0.0	260.0	∞
	8	0.0	5.6	100
	9	0.0	245.0	∞
V203	1	0.0	1.6	100
Buffer	2	0.0	-0.5	4.7K
(6688)	3	0.0	1.6	100
	4	6.3	6.3	3.9
	5	0.15	0.15	3.7
	6	0.0	0.0	∞
	7	-1.5	-1.5	∞
	8	0.0	1.6	100
	9	0.0	130.0	∞
V204	1	0.0	80.0	∞
Balanced Mixer	2	-3.0	-3.7	60K
(6922)	3	0.0	1.9	220
	4	6.3	6.3	4.0
	5	0.15	0.15	3.6
	6	0.0	76.0	∞
	7	-3.0	-3.7	60K
	8	0.0	1.9	220
	9	0.0	0.0	0

*Reading depends on setting of i-f gain potentiometer R129.
+Reading depends on setting of SQUELCH control.

CONVERTER VOLTAGE AND RESISTANCE MEASUREMENTS

Conditions:

1. Units connected as shown in Figure 2-15.
2. Voltages are approximate and are based on the following:
   a. Voltages with respect to chassis ground.
   b. Input voltage set to 13.75 (for 14-volt units) or 27.5 (for 28-volt units).
   c. D-c voltage measurements are made with Hewlett-Packard Model 410B vacuum tube voltmeter.
   d. A-c voltage measurements are made with Ballantine model 300 vacuum tube voltmeter, and with "standard" test signal levels of 1.8 volts ± 0.1 volt at 30 cps and 1.8 volts ± 0.2 volt at 9960 cps.
   e. Receiver-transmitter channeled to a VOR frequency and CRS SEL set to 191.5°.
3. Resistance values are approximate and are based on the following:
   a. Converter disconnected from other units.
   b. Values are in ohms with respect to chassis ground. Multipliers: K = 1000, M = 1,000,000.
   c. Hewlett-Packard model 410B vacuum tube voltmeter used for measurements.

Test Point		Voltage		Resistance
Tube	Pin	DC	AC	(ohms)
V401 10-kc and 30-cps Amplifier (5670)	1	7.4	—	3
	2	3.4	—	1.8K
	3	-1.2	0.36	5M
	4	170.00	4.4	140K
	5	—	0.42	∞
	6	165.0	5.1	140K
	7	3.2	2.4	46K
	8	6.4	—	1.5K
	9	1.0	—	1.8
V402 Cathode Follower (5670)	1	13.5	—	3
	2	16.0	16.5	3.4K
	3	25.5	25.0	900K
	4	22.5	—	150K
	5	—	0.14	∞
	6	120.0	1.2	150K
	7	17.0	4.4	1M
	8	18.5	4.0	3.8K
	9	7.4	—	3
V403 Reference Channel 30-cps Amplifier (5751)	1	220.0	31.0	100K
	2	—	2.6	1M
	3	2.7	—	4K
	4	13.5	—	3
	5	1.1	—	1.8
	6	200.0	2.4	300K
	7	0.0	0.1	500K
	8	2.3	—	2.8K
	9	7.4	—	4.5

Test Point		Voltage		Resistance
Tube	Pin	DC	AC	(ohms)
V404 Common Channel Amplifier and Cathode Follower (5670)	1	1.0	—	1.8
	2	3.6	—	1.8K
	3	—	0.8	1M
	4	160.0	10.0	200K
	5	—	1.2	∞
	6	190.0	1.3	150K
	7	56.0	—	1M
	8	62.0	9.8	10K
	9	7.2	—	3
V405 Variable Channel 30-cps Amplifier and Cathode Follower (5670)	1	7.2	—	3
	2	5.0	—	2.6K
	3	—	1.7	300K
	4	175.0	19.0	100K
	5	—	0.28	∞
	6	140.0	1.8	150K
	7	8.0	16.5	1M
	8	10.0	16.0	2K
	9	13.5	—	3

DYNAVERTER VOLTAGE MEASUREMENTS

Conditions:

1. For all measurements except those on Q308-Q314, Hewlett-Packard model 200AB audio oscillator, adjusted for an output of 0.25 volt modulated at 25 per cent of 1000 cps, connected in series with a 100-ohm resistor to pin 3 of J301. All other connections between units and accessories as shown in Figure 2-15.
2. For measurements on Q308 - Q314 units connected as shown in Figure 2-15 with no marker signal input.
3. Input voltage set to 13.75 (for 14-volt units) or 27.5 (for 28-volt units).
4. Values are with respect to chassis ground.
5. Hewlett-Packard model 410B vacuum tube voltmeter used for d-c measurements. Ballantine model 300 vacuum tube voltmeter used for a-c measurements.
6. Measurements for 14- and 28-volt units are identical except where 28-volt readings are enclosed in parentheses.

Test Point		Voltage	
Transistor	Element	AC	DC
Q301 Microphone Amplifier (2N270)	B E C	0.125 0.100 0.8	2.8 3.1 0.2
Q302 and Q303 Multivibrator (14 V: 2N1545; 28 V; 2N1546)	B E C	— — 0.0	50.0 50.0 0.0
Q304 and Q305 Driver (14 V: 2N176; 28V: 2N375)	B E C	2.25 1.1 2.4	12.1 11.0 0.2
Q306 and Q307 Output (14 V: 2N176; 28 V: 2N375)	B E C	6.5 6.5 2.4	12.0 12.5 0.2
Q308 Autodyne (2N384)	B E C	9.0 (9.2) 9.2 (9.3) 0.0	— — —
Q309 I-f Amplifier (2N384)	B E C	9.5 9.7 0.0	— — —
Q310 Amplifier-Detector (2N384)	B E C	9.3 (9.1) 9.6 (9.3) 0.7 (0.76)	— — —
Q311 Audio Amplifier (2N647)	B E C	0.7 (0.76) 0.57 (0.63) 8.2 (7.7)	— — —
Q312, Q313, and Q314 Lamp Amplifiers (2N1183)	B E C	13.75 (27.5) 13.75 (27.5) 0.0	— — —

DYNAVERTER AUXILIARY INPUT DATA.

Pin No.	Impedance (ohms)	Nominal volts for 5 watts out	Nominal Milliwatts in for 5 watts out
9	330	7.0	150
13	330	7.0	150
14	200	2.4	30
15	330	7.0	150
16	200	2.4	30

RECEIVER STAGE GAIN MEASUREMENTS.

Conditions:

1. Equipment connected as shown in figure 2-10. Preliminary procedure outlined in table applies.
2. Receiver channeled to 126.00 mc.
3. 455-kc, 2.0-mc, and 20-mc i-f signals supplied by measurements model 65-B signal generator, or equivalent. The signal is coupled through a 6-db attenuator, such as a Boonton Radio Type 505B, to all measuring points. The ground lead of the signal generator is connected to the chassis.
4. The input shown for the 455-kc, 2.0-mc, and 20-mc signals is the signal level required to obtain 5 volts between TP3 and chassis ground. This voltage is metered by a d-c vacuum tube voltmeter, such as Hewlett-Packard model 410B.
5. 126.00-mc r-f signal is supplied by Boonton Radio type 211-A signal generator, or equivalent. The signal is coupled through a 6-db attenuator, such as a Boonton Radio type 505B, to all measuring points. The ground lead of the signal generator is connected to the chassis.
6. Input shown for 126.00-mc signal is the signal level required to obtain 5 volts between TP3 and chassis ground. This voltage must be metered by a d-c vacuum tube voltmeter, such as a Hewlett-Packard model 410B.

Tube	Signal Input		Conditions
	Pin No.	Voltage	
455-KC I-F			
V107* 455-kc I-f Amplifier	1	400K uv	1, 2, 3, and 4
V106 455-kc I-f Amplifier	1	5.6K uv	
V105 Converter	7	950 uv	
2.0-MC I-F			
V105 Converter	7	3.8 K uv	1, 2, 3, and 4
V104 I-f Amplifier	1	240 uv	
V103A Second Mixer	2	23 uv	
20-MC I-F			
V103A Second Mixer	2	7 uv	1, 2, 3, and 4
V102 First Mixer	1	8 uv	
126.00-MC R-F			
V102 First Mixer	1	18 uv	1, 2, 5, and 6
J101 Antenna Jack	—	2 uv	

*Remove attenuator and apply signal directly to pin 1 of V107. Specified input is required to obtain -1 volt at TP3.

CESSNA NAV/COM 500

Diagrams

Figure 2-15. Nav/Com 500 Interconnection Diagram

Figure 2-16. Receiver-Transmitter, Schematic Diagram

Figure 2-17. Receiver-Transmitter, Main Assembly Wiring Diagram

Figure 2-18. Receiver-Transmitter, Printed Circuit Assembly

Figure 2-19. Converter, Schematic Diagram

Figure 2-20. Converter, Wiring Diagram

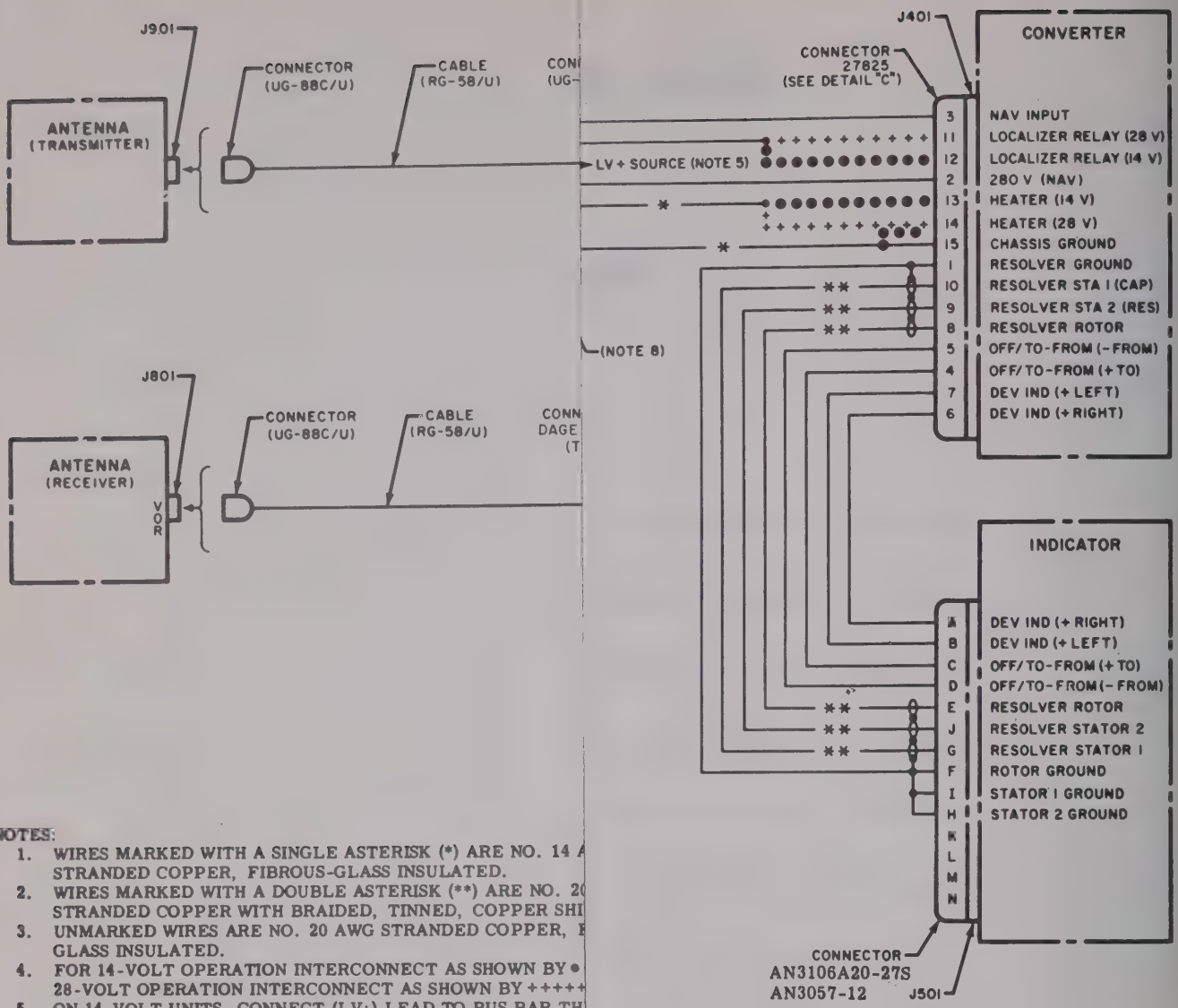
Figure 2-21. Dynaverter, Wiring Diagram

Figure 2-22. Dynaverter, Schematic Diagram

Figure 2-23. Dynaverter, Marker Beacon Receiver Wiring Diagram

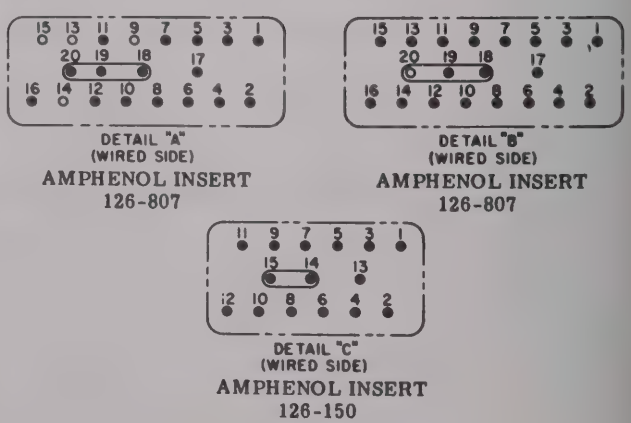
Figure 2-24. Course Indicator, Schematic Diagram

Figure 2-25. Bench Test Cable Harness Assembly 28895, Wiring Diagram



NOTES:

1. WIRES MARKED WITH A SINGLE ASTERISK (*) ARE NO. 14 A STRANDED COPPER, FIBROUS-GLASS INSULATED.
2. WIRES MARKED WITH A DOUBLE ASTERISK (**) ARE NO. 2(STRANDED COPPER WITH BRAIDED, TINNED, COPPER SHI
3. UNMARKED WIRES ARE NO. 20 AWG STRANDED COPPER, E GLASS INSULATED.
4. FOR 14-VOLT OPERATION INTERCONNECT AS SHOWN BY • 28-VOLT OPERATION INTERCONNECT AS SHOWN BY +++++
5. ON 14-VOLT UNITS, CONNECT (LV+) LEAD TO BUS BAR TH AMPERE CIRCUIT BREAKER. ON 28-VOLT UNITS, CONNEC LEAD TO BUS BAR THROUGH 5-AMPERE CIRCUIT BREAKE
6. FOR PROPER GROUNDING, AIRCRAFT SURFACES TO WHIC MOUNTINGS OR UNITS ARE ATTACHED MUST BE CLEAN, B
7. POWER IS APPLIED TO THE DYNAVERTER BY THE VOL S WHEN UNITS ARE CONNECTED AS SHOWN BY oooooo. IF DE DYNAVERTER MAY BE CONNECTED DIRECTLY TO THE L SHOWN BY •••••. THIS CONNECTION BYPASSES THE ON-O SO THAT DYNAVERTER MAY BE USED AS THE SYSTEM A AMPLIFIER.
8. IF SPEAKER IS NOT USED, TERMINATE PIN 1 OF J301 IN A WATT RESISTOR.
9. OUTPUT TO INDICATOR IS FOR ONE LOAD ONLY; DO NOT PARALLEL LOADS.



NOTE
IF COMPLETE PLUG IS NEEDED ORDER BY PART NUMBER SHOWN ON DIAGRAM.

Figure 2-15. Single Nav/Com 500 System, Interconnection Diagram

NOTES:

1. FOR MAIN WIRING DIAGRAM.
2. RESISTOR VALUES ARE IN OH
   M = 1,000,000.
3. CAPACITOR VALUES ARE IN M
   OTHERWISE NOTED.
4. INDUCTOR VALUES ARE IN MI
5. VALUES OF R135, R157, R164,
   SELECTED DURING FINAL FA
   SPECIFIED ARE APPROXIMAT
6. RELAY K101 IS SHOWN UNENE

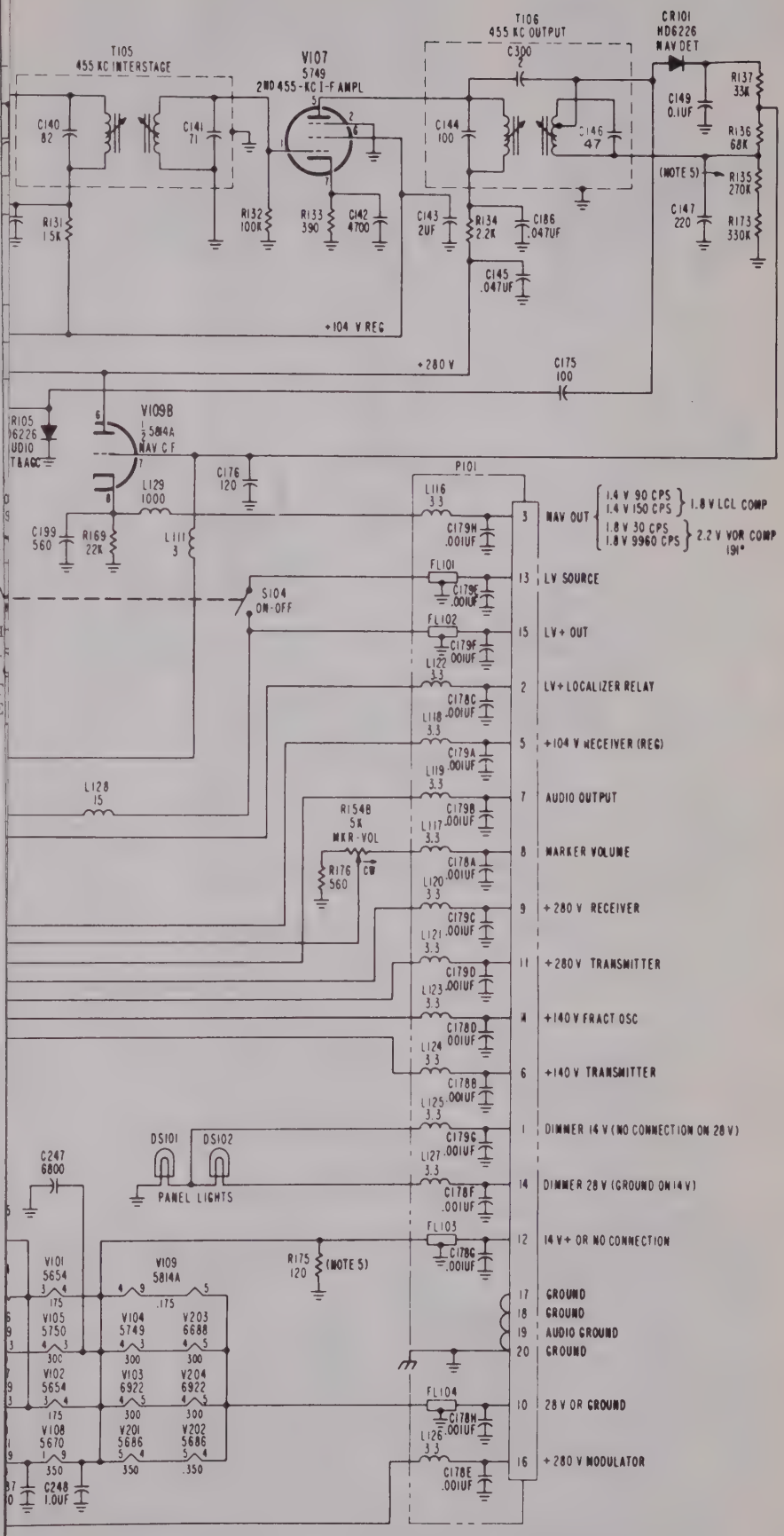
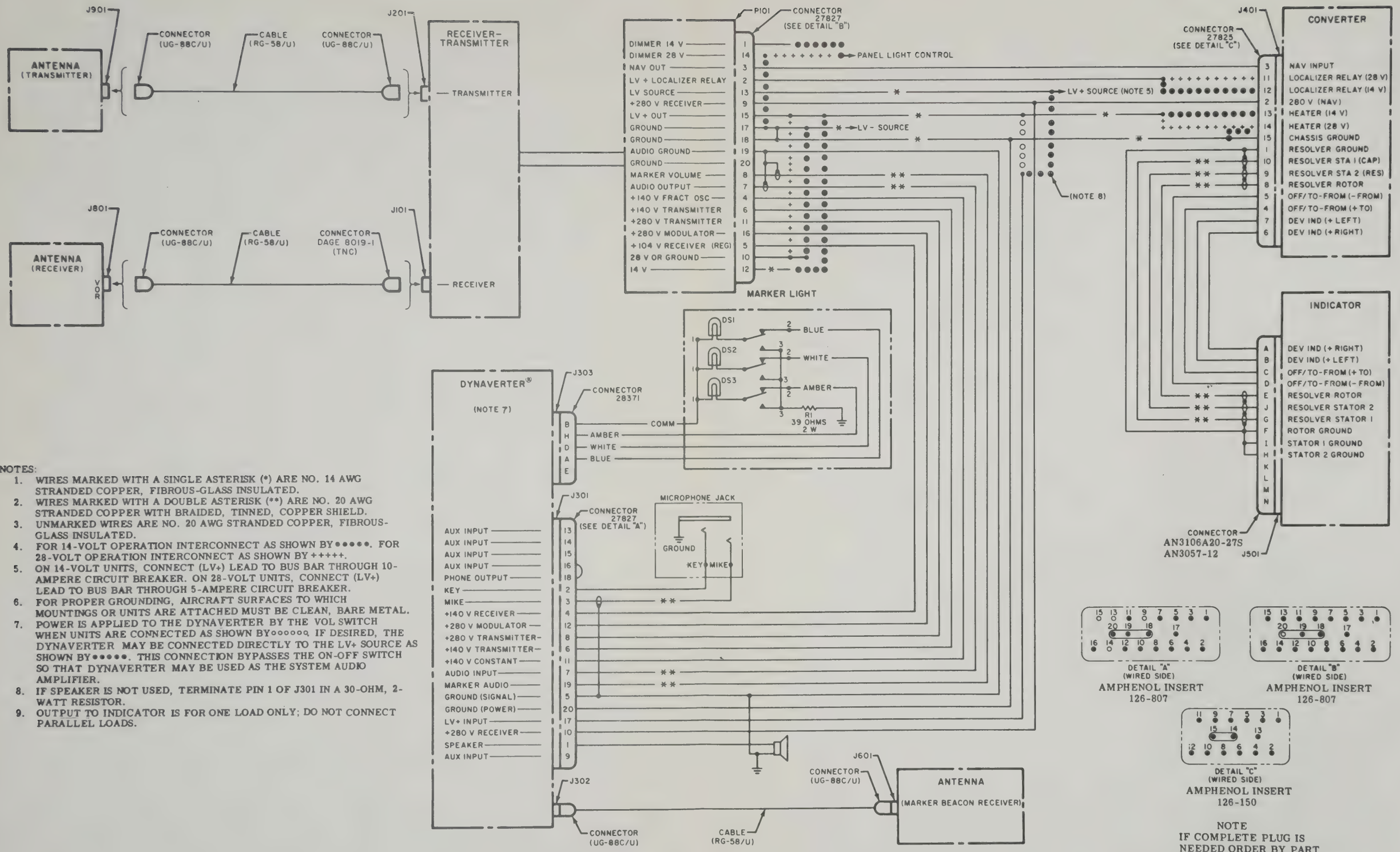


Figure 2-16. Receiver-Transmitter, Schematic Diagram



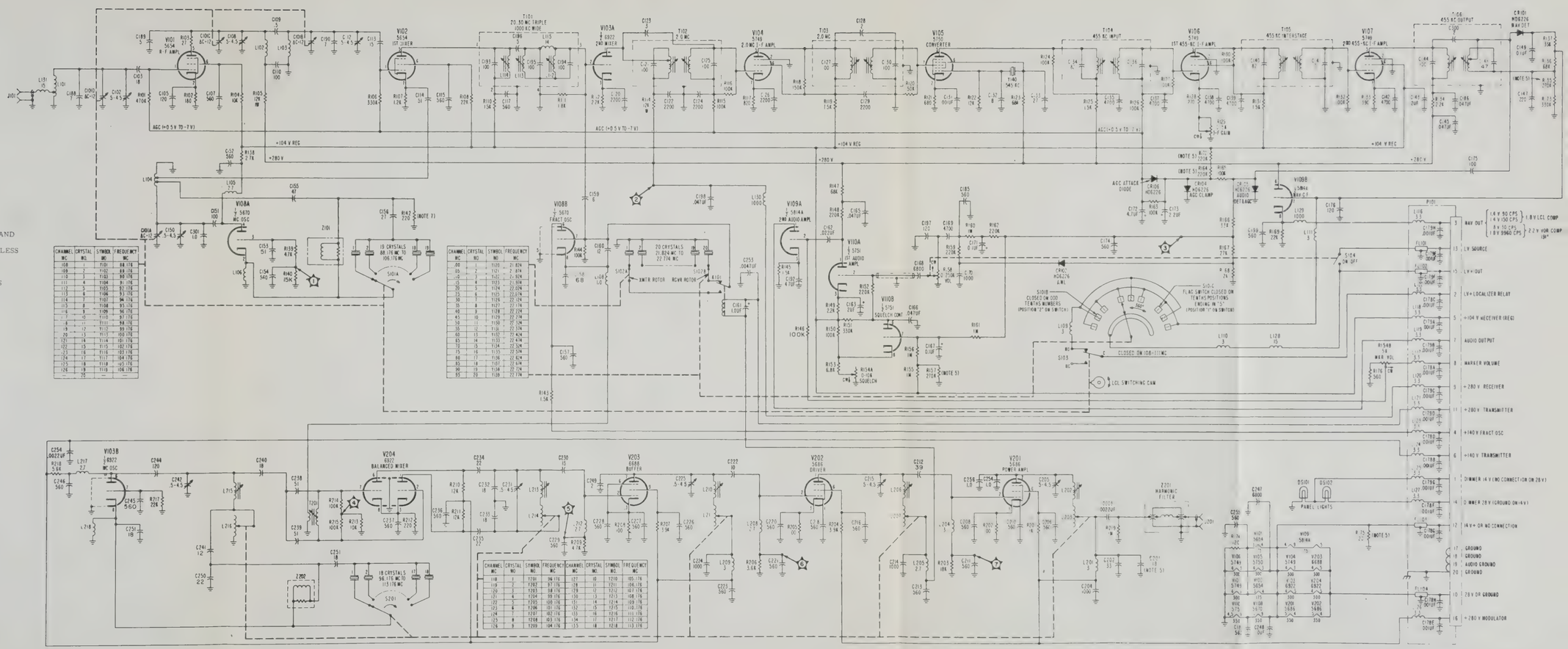
NOTES:

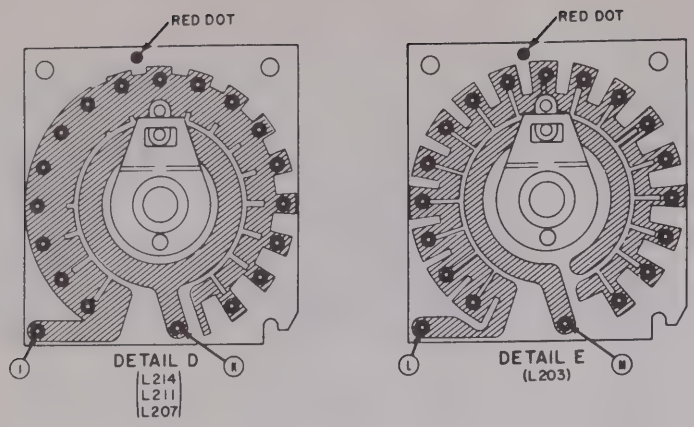
1. WIRES MARKED WITH A SINGLE ASTERISK (*) ARE NO. 14 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED.
2. WIRES MARKED WITH A DOUBLE ASTERISK (**) ARE NO. 20 AWG STRANDED COPPER WITH BRAIDED, TINNED, COPPER SHIELD.
3. UNMARKED WIRES ARE NO. 20 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED.
4. FOR 14-VOLT OPERATION INTERCONNECT AS SHOWN BY●●●●●. FOR 28-VOLT OPERATION INTERCONNECT AS SHOWN BY +++++.
5. ON 14-VOLT UNITS, CONNECT (LV+) LEAD TO BUS BAR THROUGH 10-AMPERE CIRCUIT BREAKER. ON 28-VOLT UNITS, CONNECT (LV+) LEAD TO BUS BAR THROUGH 5-AMPERE CIRCUIT BREAKER.
6. FOR PROPER GROUNDING, AIRCRAFT SURFACES TO WHICH MOUNTINGS OR UNITS ARE ATTACHED MUST BE CLEAN, BARE METAL.
7. POWER IS APPLIED TO THE DYNAVERTER BY THE VOL SWITCH WHEN UNITS ARE CONNECTED AS SHOWN BY○○○○○○. IF DESIRED, THE DYNAVERTER MAY BE CONNECTED DIRECTLY TO THE LV+ SOURCE AS SHOWN BY●●●●●. THIS CONNECTION BYPASSES THE ON-OFF SWITCH SO THAT DYNAVERTER MAY BE USED AS THE SYSTEM AUDIO AMPLIFIER.
8. IF SPEAKER IS NOT USED, TERMINATE PIN 1 OF J301 IN A 30-OHM, 2-WATT RESISTOR.
9. OUTPUT TO INDICATOR IS FOR ONE LOAD ONLY; DO NOT CONNECT PARALLEL LOADS.

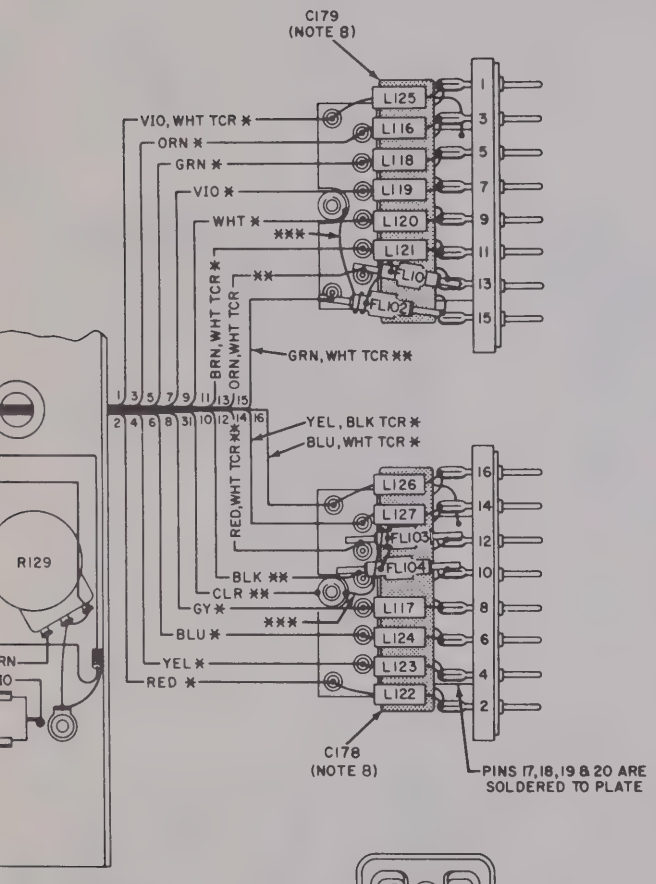
NOTE
IF COMPLETE PLUG IS NEEDED ORDER BY PART NUMBER SHOWN ON DIAGRAM.

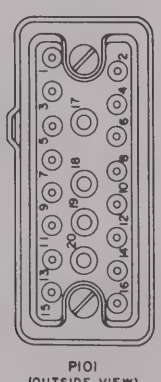
Figure 2-15. Single Nav/Com 500 System, Interconnection Diagram

NOTES:
1. FOR MAIN WIRING DIAGRAM SEE FIGURE 2-17.
2. RESISTOR VALUES ARE IN OHMS. MULTIPLIER(S) K = 1,000 AND M = 1,000,000.
3. CAPACITOR VALUES ARE IN MICROMICROFARADS ($\mu\mu$F) UNLESS OTHERWISE NOTED.
4. INDUCTOR VALUES ARE IN MICROHENRIES (μH).
5. VALUES OF R135, R157, R164, R172, R175, AND C201 ARE SELECTED DURING FINAL FACTORY ADJUSTMENT. VALUES SPECIFIED ARE APPROXIMATE.
6. RELAY K101 IS SHOWN UNENERGIZED.


V101 5654 R F AMPL
V102 5654 1ST MIXER
T101 20.35 MC TRIPLE 1000 KC WIDE
V103A 6922 2ND MIXER
T102 2.0 MC
V104 5749 2.0 MC I-F AMPL
T103 2.0 MC
V105 5702 CONVERTER
T104 455 KC INPUT
V106 5749 1ST 455 KC I-F AMPL
T105 455 KC INTERSTAGE
V107 5749 2ND 455 KC I-F AMPL
455 KC OUTPUT
CR101 MD826 RAY DET
AGC (+0.5 V TO -7 V)
+104 V REG
+280 V
-28 V
V108A 5670 MC OSC
V108B FRACT OSC
V109A 5814A 2ND AUDIO AMPL
V110A 5751 1ST AUDIO AMPL
V110B SQUELCH CONT
V103B 6922 MC OSC
V204 6922 BALANCED MIXER
V203 6688 BUFFER
V202 5686 DRIVER
V201 5686 POWER AMPL
Z201 HARMONIC FILTER
S101 ON OFF
S102 MC FREQUENCY SELECTOR
S103 RC
S104 LCL SWITCHING CAM
S105 CLOSED ON 108-111 MC
S106 CLOSED ON 100 TENTHS NUMBERS (POSITION "2" ON S-METER)
S107 FLAG SWITCH CLOSED ON TENTHS POSITIONS ENDING IN "5" (POSITION "5" ON S-METER)
S108 CLOSED ON 108-111 MC
S109 FLAG SWITCH CLOSED ON TENTHS POSITIONS ENDING IN "5" (POSITION "5" ON S-METER)
S110 CLOSED ON 108-111 MC
S111 FLAG SWITCH CLOSED ON TENTHS POSITIONS ENDING IN "5" (POSITION "5" ON S-METER)
S112 CLOSED ON 108-111 MC


RED DOT
DETAIL D
L214
L211
L207
RED DOT
DETAIL E
(L203)


C179
(NOTE 8)
L125
L116
L118
L119
L120
L121
FL101
FL102
VIO, WHT TCR *
ORN *
GRN *
VIO *
WHT *
***
**
BRN, WHT TCR *
ORN, WHT TCR
GRN, WHT TCR **
YEL, BLK TCR *
BLU, WHT TCR *
RED, WHT TCR **
L126
L127
FL103
FL104
BLK **
CLR **
GY *
BLU *
YEL *
RED *
L117
L124
L123
L122
C178
(NOTE 8)
PINS 17, 18, 19 & 20 ARE
SOLDERED TO PLATE
R129
LATE TURNED DOWN


P101
(OUTSIDE VIEW)

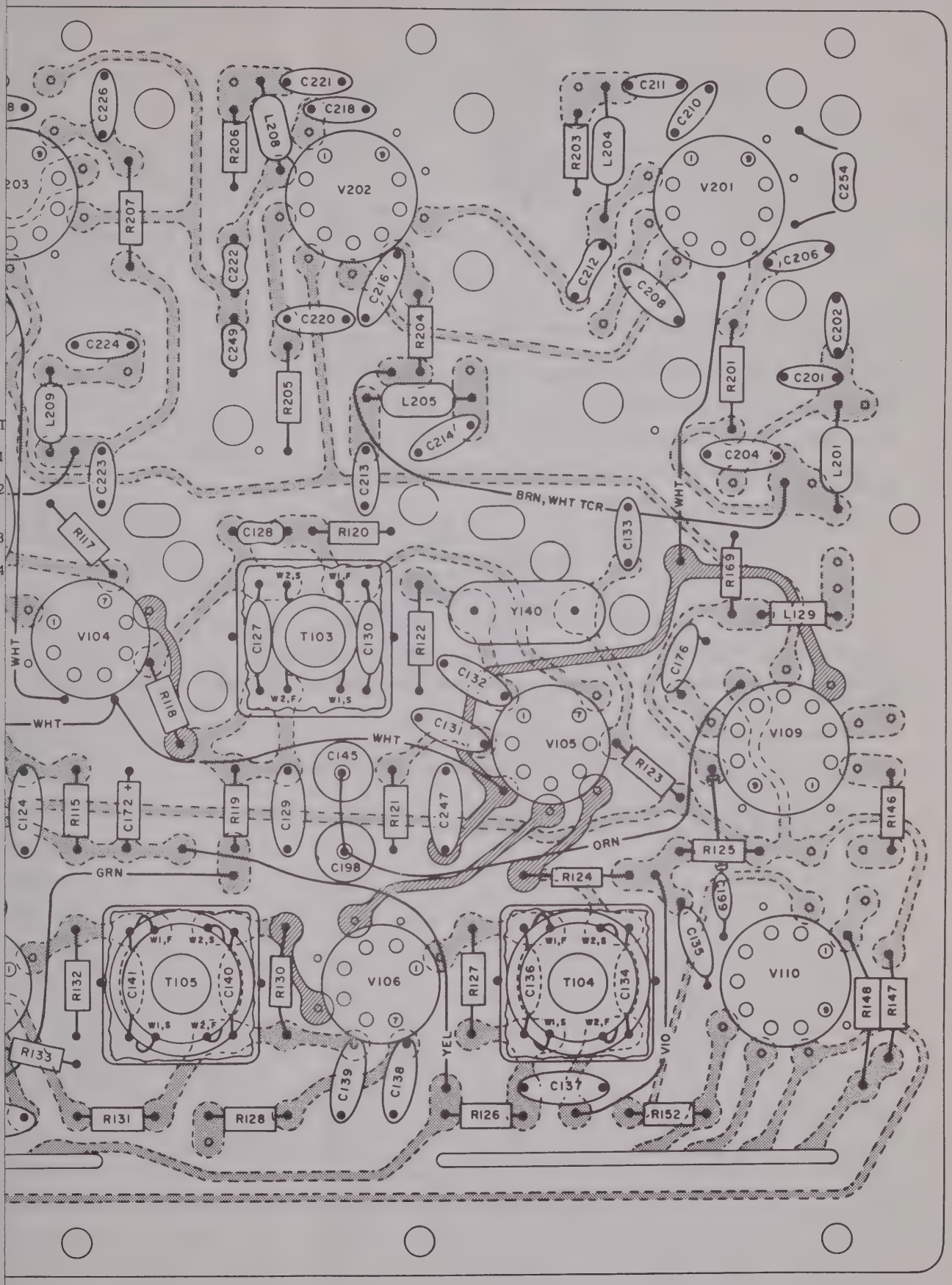
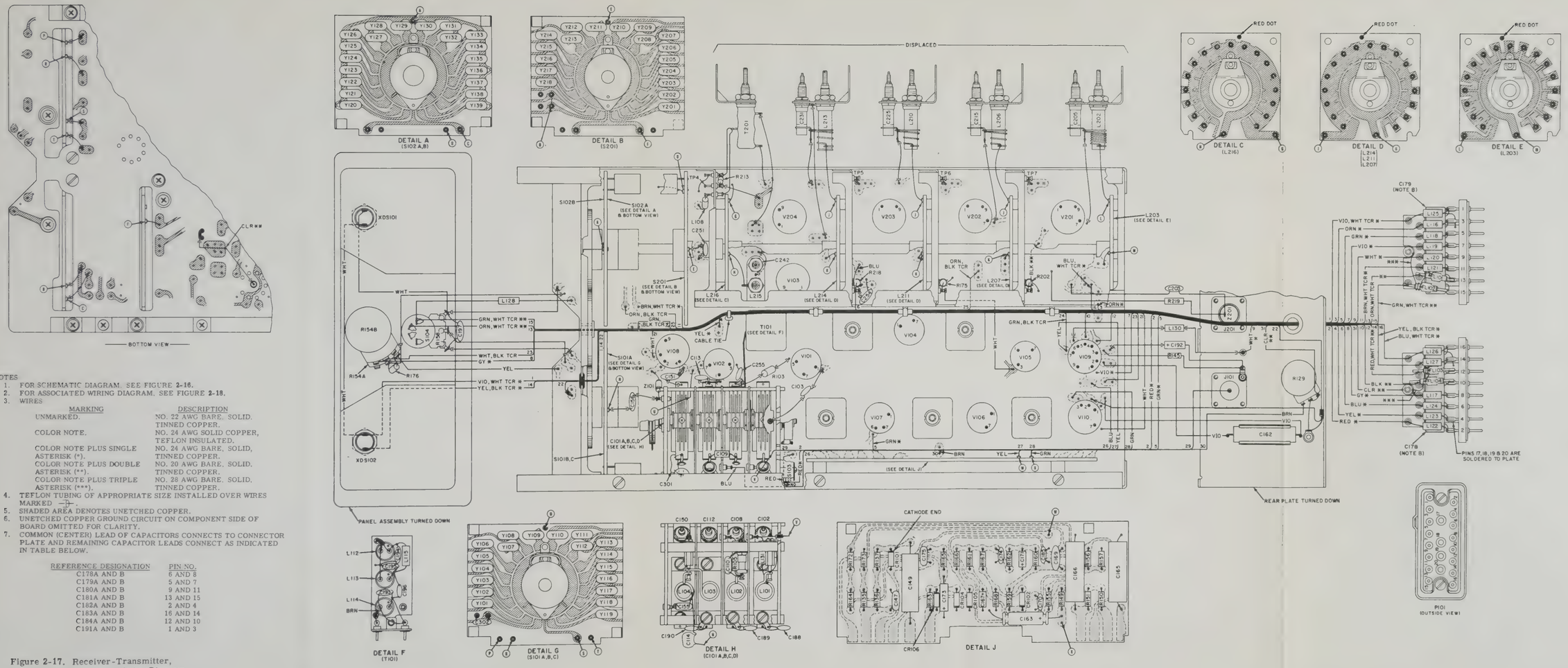


Figure 2-18. Receiver-Transmitter, Printed Circuit Wiring Diagram



NOTES

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 2-16.
2. FOR ASSOCIATED WIRING DIAGRAM, SEE FIGURE 2-18.
3. WIRES

MARKING	DESCRIPTION
UNMARKED.	NO. 22 AWG BARE, SOLID. TINNED COPPER.
COLOR NOTE.	NO. 24 AWG SOLID COPPER, TEFLON INSULATED.
COLOR NOTE PLUS SINGLE ASTERISK (*).	NO. 24 AWG BARE, SOLID, TINNED COPPER.
COLOR NOTE PLUS DOUBLE ASTERISK (**).	NO. 20 AWG BARE, SOLID, TINNED COPPER.
COLOR NOTE PLUS TRIPLE ASTERISK (***).	NO. 28 AWG BARE, SOLID, TINNED COPPER.

4. TEFLON TUBING OF APPROPRIATE SIZE INSTALLED OVER WIRES MARKED —||—.
5. SHADED AREA DENOTES UNETCHED COPPER.
6. UNETCHED COPPER GROUND CIRCUIT ON COMPONENT SIDE OF BOARD OMITTED FOR CLARITY.
7. COMMON (CENTER) LEAD OF CAPACITORS CONNECTS TO CONNECTOR PLATE AND REMAINING CAPACITOR LEADS CONNECT AS INDICATED IN TABLE BELOW.

REFERENCE DESIGNATION	PIN NO.
C178A AND B	6 AND 8
C179A AND B	5 AND 7
C180A AND B	9 AND 11
C181A AND B	13 AND 15
C182A AND B	2 AND 4
C183A AND B	16 AND 14
C184A AND B	12 AND 10
C191A AND B	1 AND 3

Figure 2-17. Receiver-Transmitter, Main Assembly Wiring Diagram

NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE **2-16.**
2. WIRES MARKED WITH COLOR NOTE ARE NO. 24 AWG SOLID COPPER. TEFLON INSULATED.
3. SHADED AREA DENOTES UNETCHED COPPER.
4. UNETCHED COPPER GROUND CIRCUIT ON COMPONENT SIDE OF BOARD IS OMITTED FOR CLARITY.

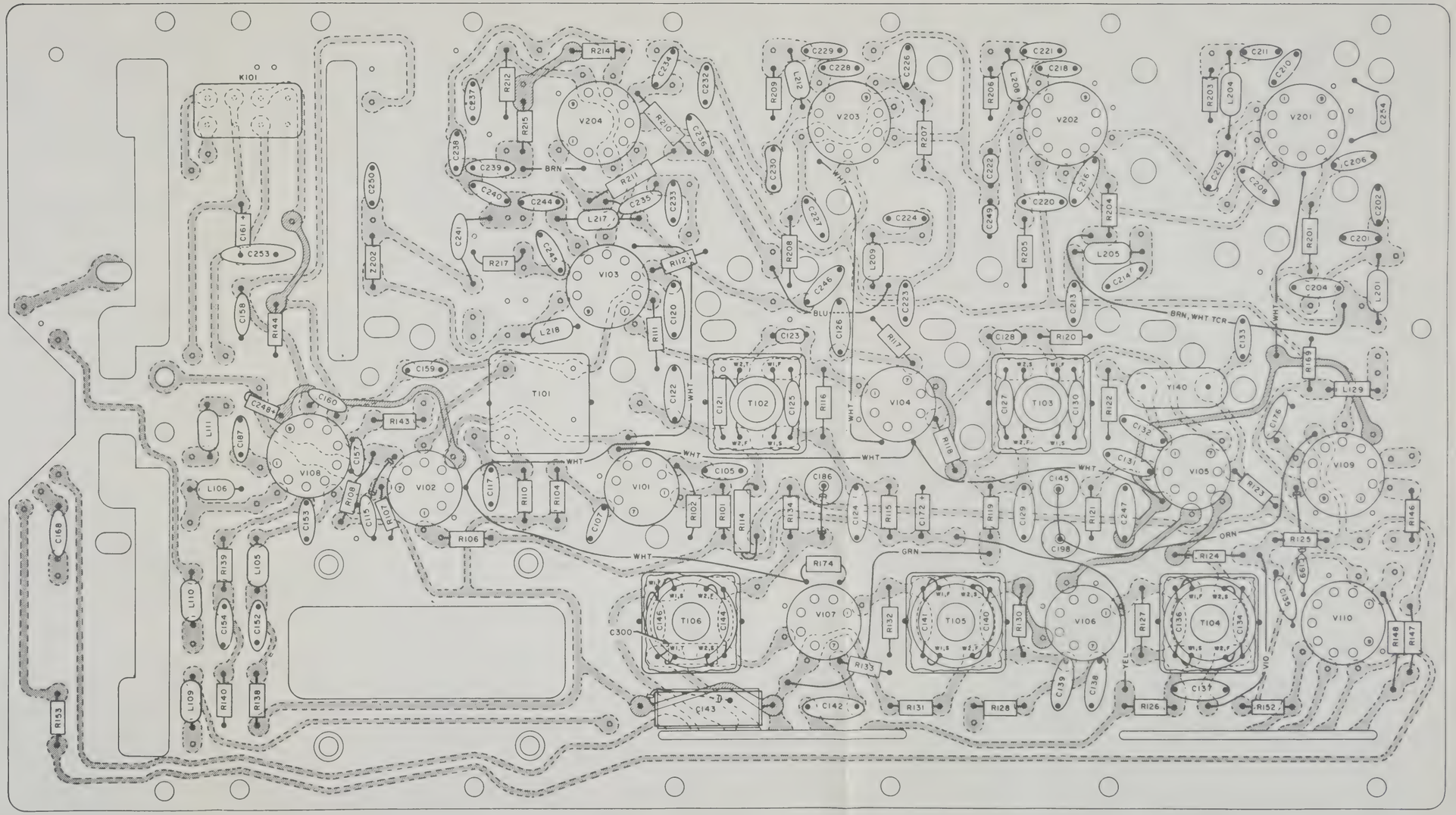
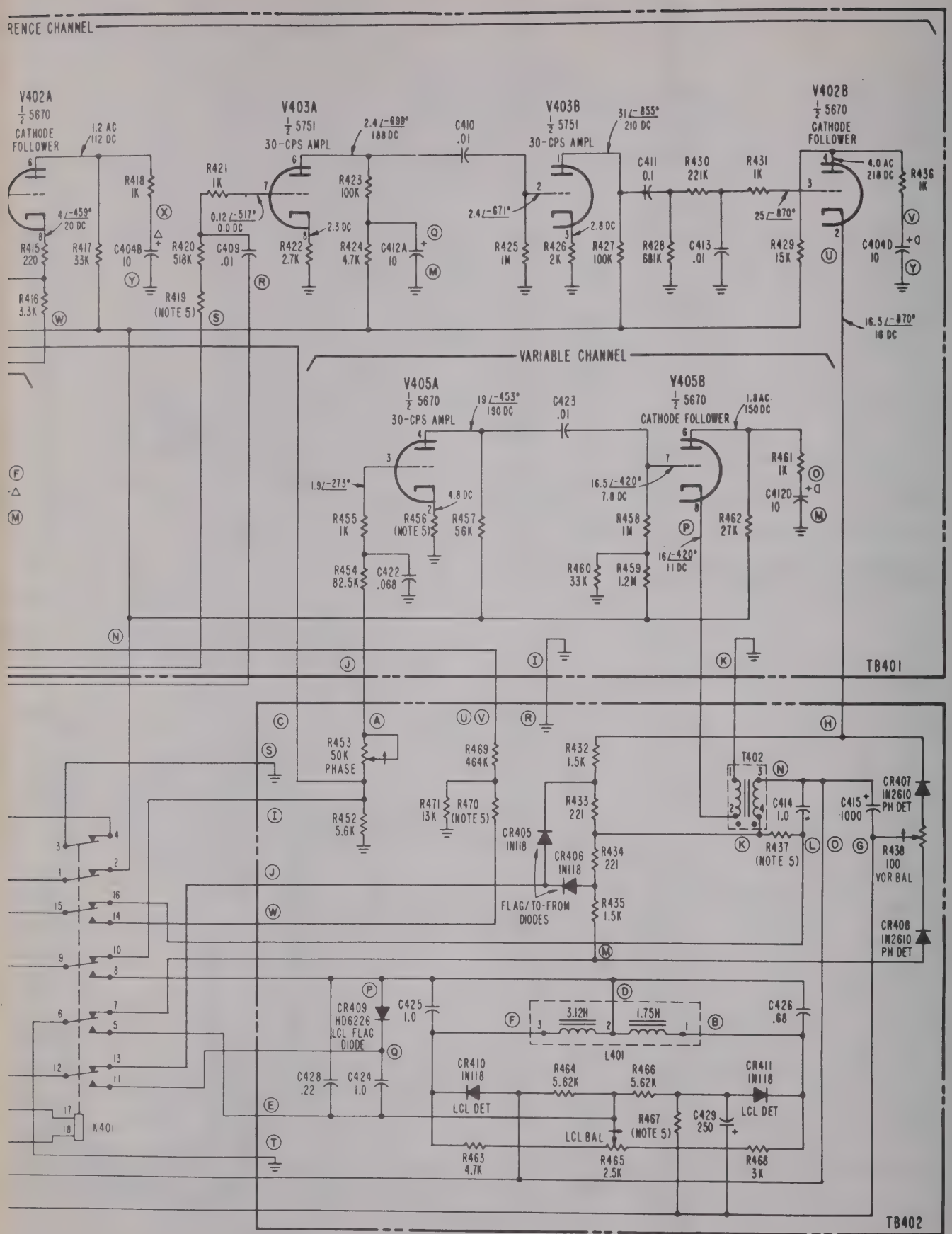
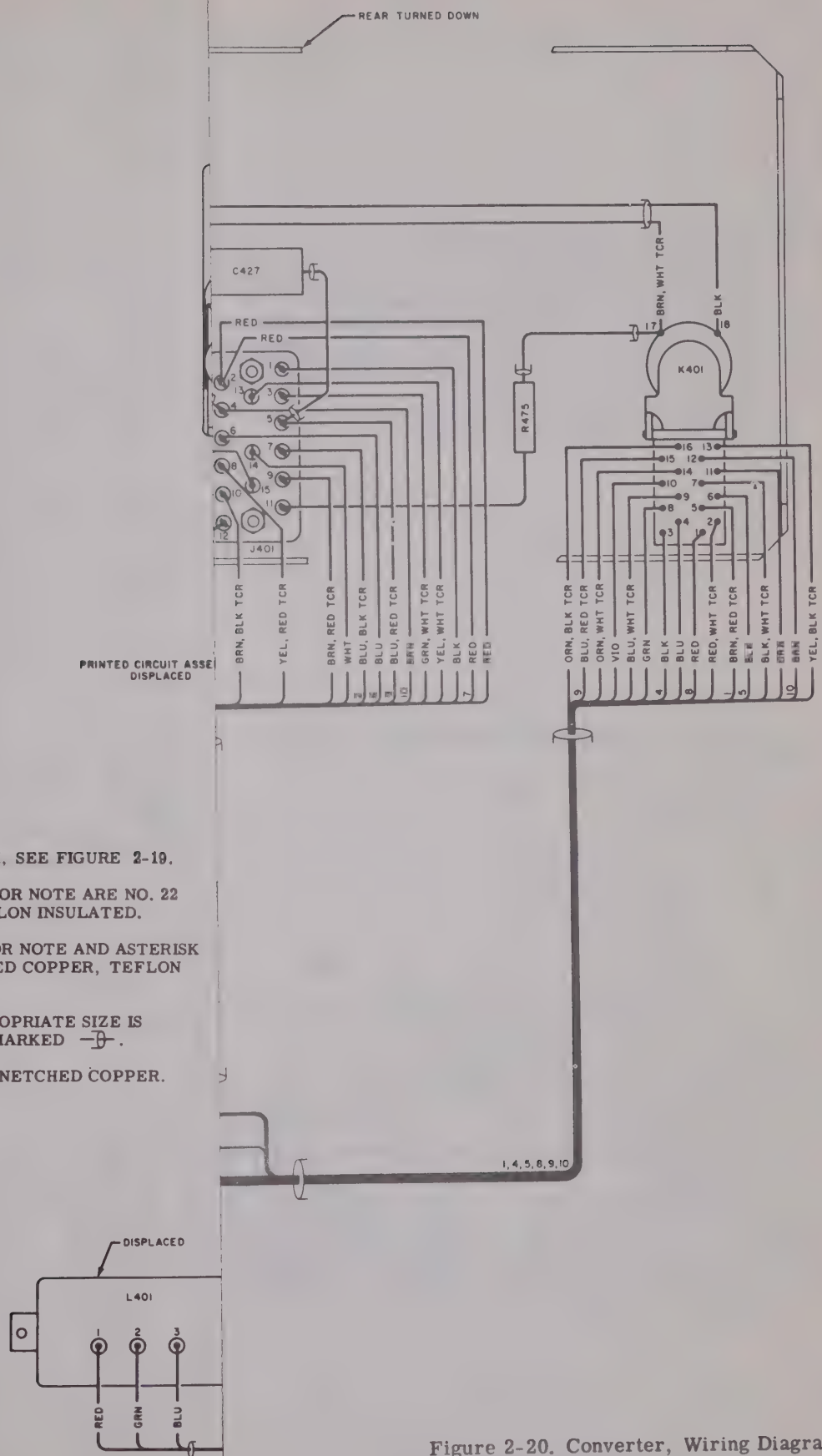


Figure 2-18. Receiver-Transmitter, Printed Circuit Wiring Diagram


RENCE CHANNEL
V402A
1/2 5670
CATHODE FOLLOWER
1.2 AC
112 DC
R418 1K
R415 220
R417 33K
C404B 10
R416 3.3K
R419 (NOTE 5)
V403A
1/2 5751
30-CPS AMPL
2.4 /-699°
188 DC
C410 .01
R421 1K
0.12 /-517°
0.0 DC
R423 100K
2.3 DC
R420 518K
C409 .01
R422 2.7K
R424 4.7K
C412A 10
V403B
1/2 5751
30-CPS AMPL
31 /-855°
210 DC
2.4 /-671°
2.8 DC
C411 0.1
R430 221K
R431 1K
R425 1M
R426 2K
R427 100K
R428 681K
C413 .01
V402B
1/2 5670
CATHODE FOLLOWER
4.0 AC
218 DC
25 /-870°
R436 1K
R429 15K
C404D 10
16.5 /-870°
16 DC
VARIABLE CHANNEL
V405A
1/2 5670
30-CPS AMPL
19 /-453°
190 DC
C423 .01
1.9 /-273°
4.8 DC
R455 1K
R456 (NOTE 5)
R457 56K
R454 82.5K
C422 .068
V405B
1/2 5670
CATHODE FOLLOWER
1.8 AC
150 DC
16.5 /-420°
7.8 DC
R458 1M
R460 33K
R459 1.2M
16 /-420°
11 DC
R462 27K
R461 1K
C412D 10
TB401
R453 50K PHASE
R452 5.6K
R469 464K
R471 13K
R470 (NOTE 5)
R432 1.5K
R433 221
CR405 IN118
CR406 IN118
R434 221
R435 1.5K
FLAG/TO-FROM DIODES
T402
C414 1.0
R437 (NOTE 5)
C415 1000
CR407 IN2610 PH DET
R438 100 VOR BAL
CR408 IN2610 PH DET
K401
CR409 HD6226 LCL FLAG DIODE
C425 1.0
C428 .22
C424 1.0
L401
3.12H
1.75H
C426 .68
CR410 IN118
LCL DET
R464 5.62K
R466 5.62K
CR411 IN118
LCL DET
LCL BAL
R467 (NOTE 5)
C429 250
R463 4.7K
R465 2.5K
R468 3K
TB402



NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 2-19.
2. WIRES MARKED WITH COLOR NOTE ARE NO. 22 AWG SOLID COPPER, TEFLON INSULATED.
3. WIRE MARKED WITH COLOR NOTE AND ASTERISK (*) IS NO. 22 AWG STRANDED COPPER, TEFLON INSULATED.
4. TEFLON TUBING OF APPROPRIATE SIZE IS INSTALLED OVER WIRES MARKED —⊟—.
5. SHADED AREA DENOTES UNETCHED COPPER.

Figure 2-20. Converter, Wiring Diagram

NOTES:

1. RESISTOR VALUES ARE IN OHMS. MULTIPLIERS: K = 1000, M = 1,000,000.
2. CAPACITOR VALUES ARE IN MICROFARADS (μF), UNLESS OTHERWISE NOTED.
3. INDUCTOR VALUES ARE IN HENRIES (H).
4. RELAY K401 IS SHOWN UNENERGIZED.
5. VALUES OF COMPONENTS LISTED ARE SELECTED AND INSTALLED DURING FINAL ADJUSTMENT.

REFERENCE DESIGNATION	LIMITING VALUE (OHMS)	PURPOSE
R419	0 - 30K	MINIMIZE QUADRANTAL ERROR
R437	470 - 820	ADJUST VOR FLAG CURRENT
R456	1.5K - 4.7K	ADJUST VOR SENSITIVITY
R467	1.8K - 6.8K	ADJUST LCL SENSITIVITY
R470	1K - 30K	ADJUST LCL FLAG CURRENT

6. CIRCLED LETTERS DENOTE EYELET LOCATIONS SHOWN ON PRINTED-CIRCUIT BOARD.
7. VOLTAGES SHOWN ARE APPROXIMATE (±10%) AND ARE MEASURED UNDER THE FOLLOWING CONDITIONS:
   - A. UNITS INTERCONNECTED AS SHOWN IN FIGURE 2-15.
   - B. VOR INPUT SIGNAL AS NECESSARY TO ENERGIZE RELAY K401. COURSE SELECTOR SET TO 191.5° (ON COURSE "TO").
   - C. VOLTAGE MEASUREMENTS MADE WITH HEWLETT-PACKARD MODEL 410B (INPUT IMPEDANCE: DC, 122M; AC, 10M AND 1.5 μμF SHUNT).

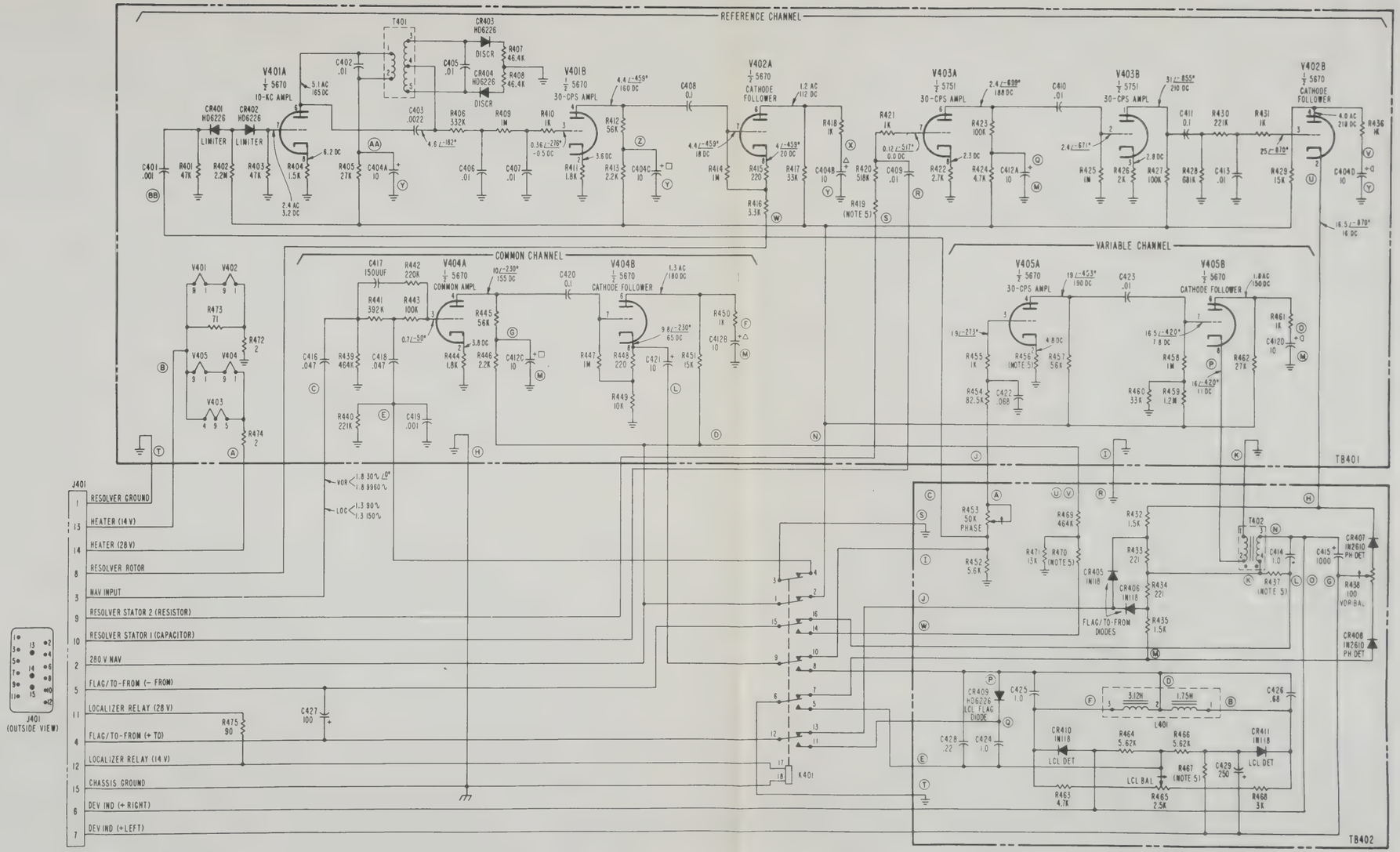


Figure 2-19. Converter, Schematic Diagram

NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 2-19.
2. WIRES MARKED WITH COLOR NOTE ARE NO. 22 AWG SOLID COPPER, TEFLON INSULATED.
3. WIRE MARKED WITH COLOR NOTE AND ASTERISK (*) IS NO. 22 AWG STRANDED COPPER, TEFLON INSULATED.
4. TEFLON TUBING OF APPROPRIATE SIZE IS INSTALLED OVER WIRES MARKED —⊕—.
5. SHADED AREA DENOTES UNETCHED COPPER.

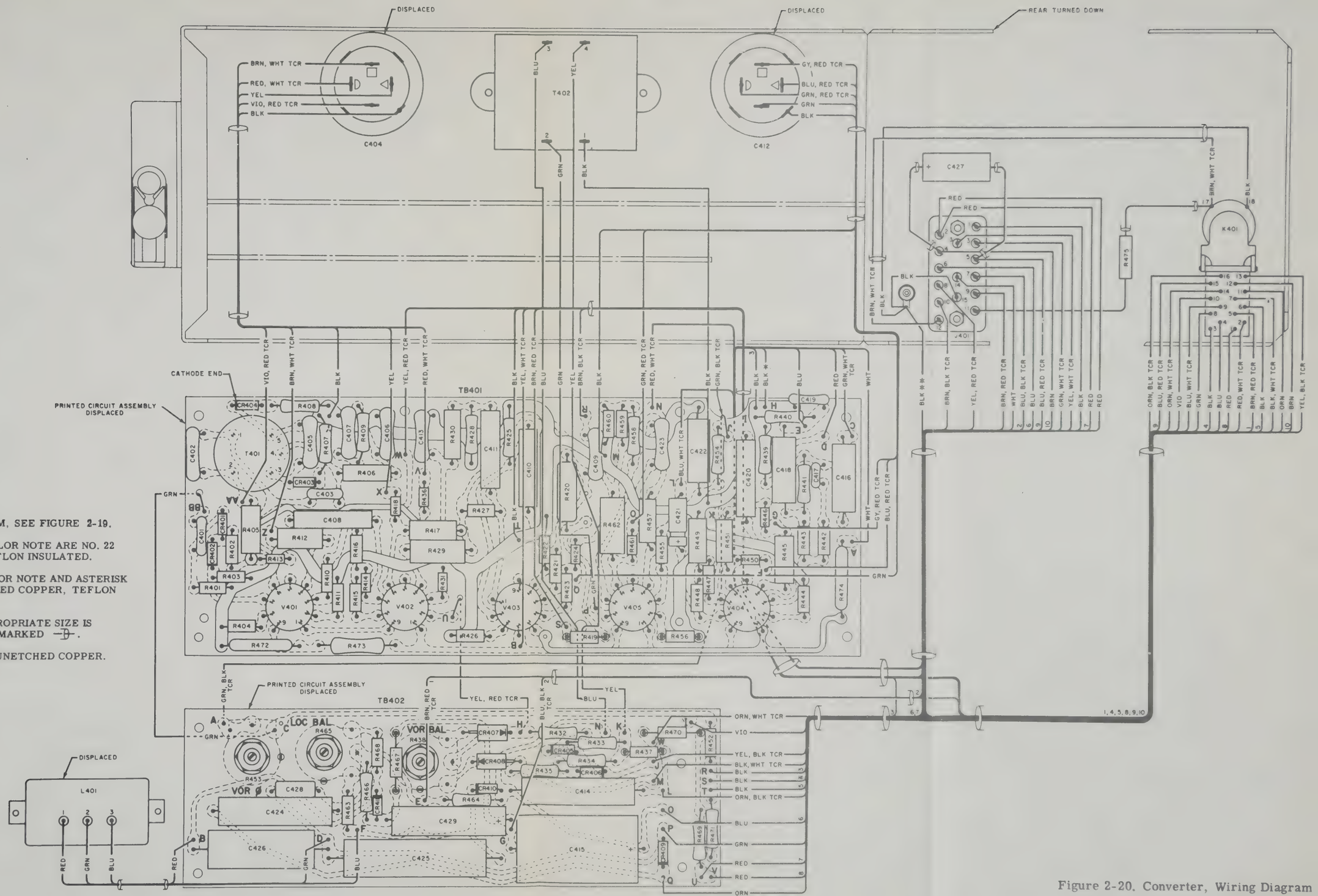
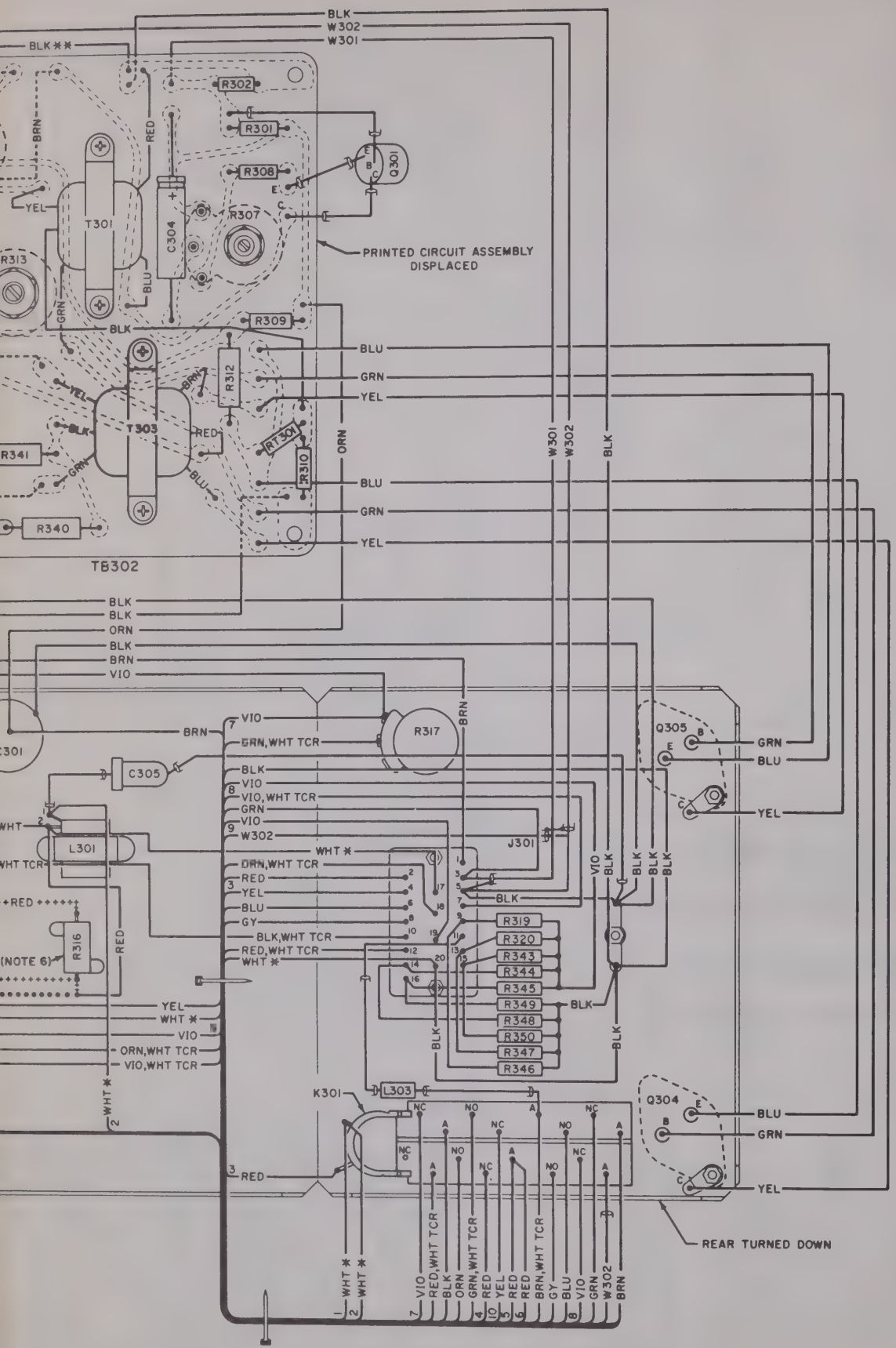


Figure 2-20. Converter, Wiring Diagram



BLK
W302
W301
BLK**
R302
R301
R308
Q301
R307
T301
C304
R313
PRINTED CIRCUIT ASSEMBLY DISPLACED
R309
R312
T303
RT301
R310
R341
R340
TB302
BLU
GRN
YEL
ORN
BRN
VIO
R317
Q305
C305
L301
R316
(NOTE 6)
J301
R319
R320
R343
R344
R345
R349
R348
R350
R347
R346
K301
L303
Q304
REAR TURNED DOWN

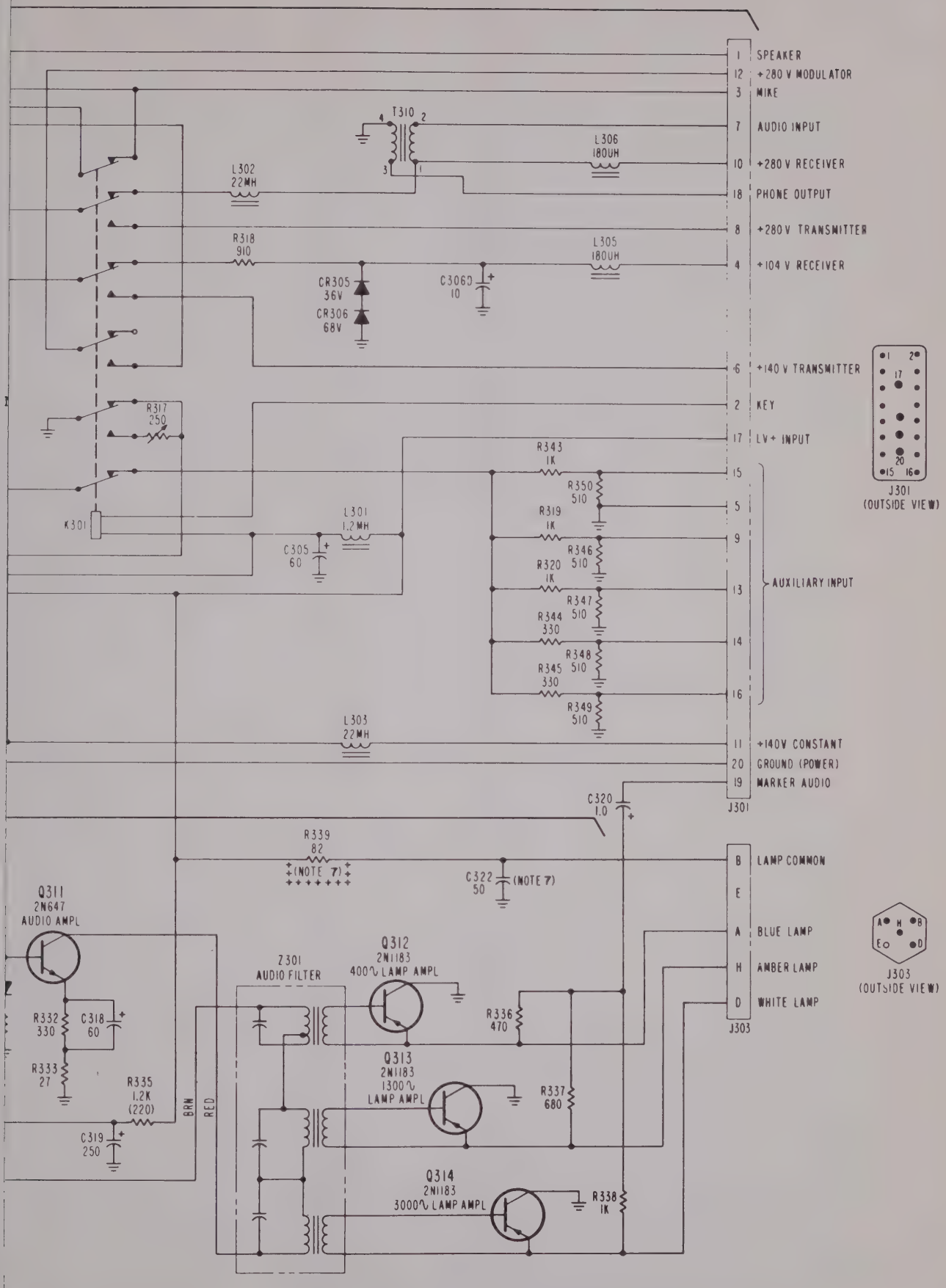


Figure 2-22. Dynaverter, Schematic Diagram

NOTES:

1. FOR SCHEMATIC DIAGRAM SEE FIGURE 2-22.
2. WIRES MARKED WITH COLOR NOTE ARE NO. 22 AWG SINGLE CONDUCTOR STRANDED COPPER, TEFLON INSULATED.
3. WIRES MARKED WITH COLOR NOTE AND ASTERISK (*) ARE NO. 20 AWG SINGLE CONDUCTOR STRANDED COPPER, TEFLON INSULATED.
4. WIRES MARKED WITH COLOR NOTE AND DOUBLE ASTERISK (**) ARE NO. 24 AWG SINGLE CONDUCTOR STRANDED COPPER, TEFLON INSULATED.
5. TEFLON TUBING OF APPROPRIATE SIZE IS INSTALLED OVER WIRES MARKED ⊣⊢.
6. CONNECTIONS FOR 14-VOLT UNITS ARE SHOWN WITH • • • • . CONNECTIONS FOR 28-VOLT UNITS ARE SHOWN WITH ++++.
7. RESISTORS R-316 AND R351 USED ONLY ON 28-VOLT UNITS.
8. USED BEGINNING WITH MODIFICATION M1.

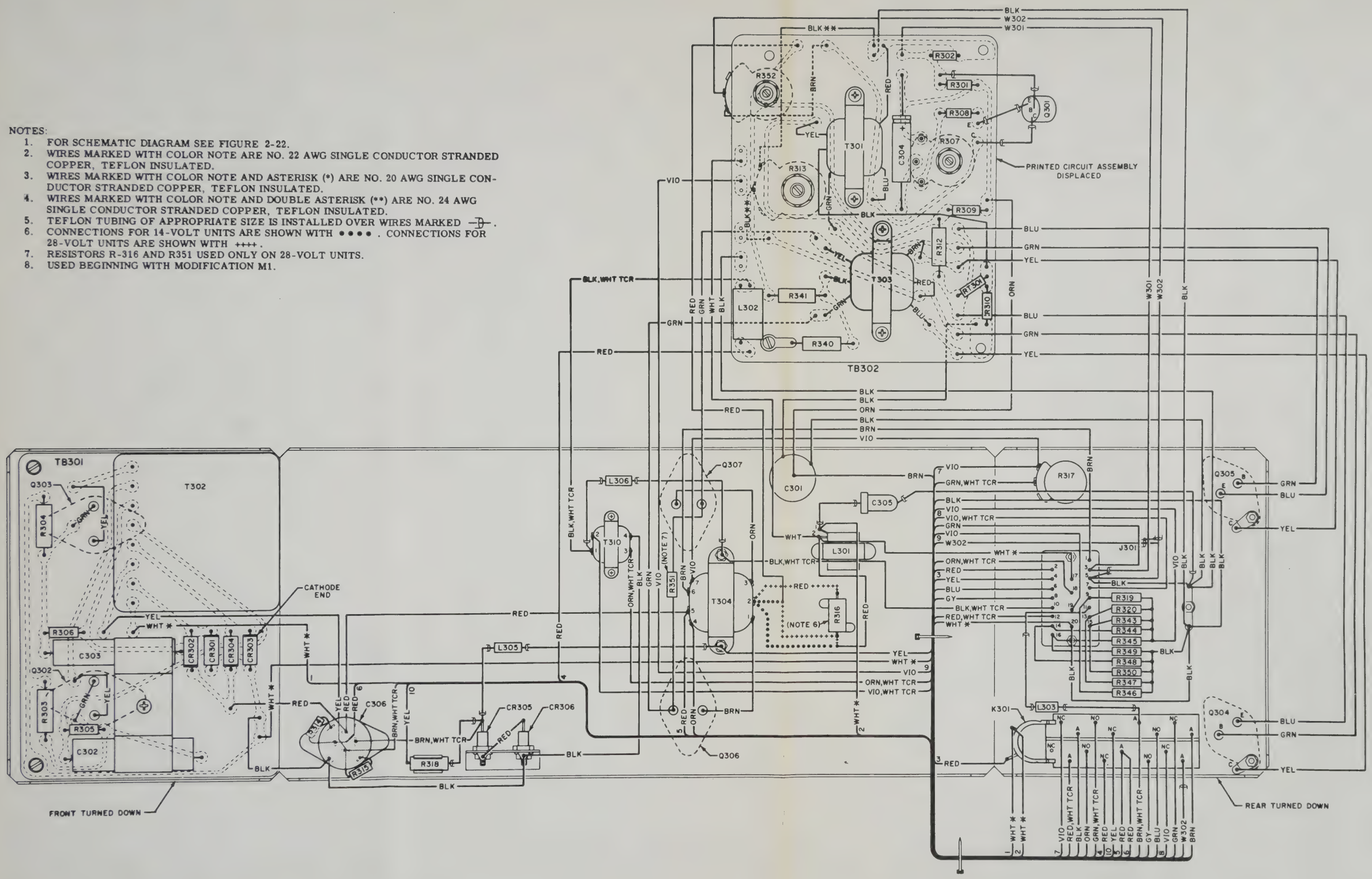


Figure 2-21. Dynaverter, Wiring Diagram

NOTES:

1. RESISTOR VALUES ARE IN OHMS: MULTIPLIER K = 1.000.
2. CAPACITOR VALUES ARE IN MICROFARADS (μF) UNLESS OTHERWISE NOTED.
3. RELAY SHOWN UNENERGIZED.
4. WIRE MARKED +++ USED ON 14-VOLT MODELS ONLY. RESISTOR R316 AND R351 USED ONLY ON 28-VOLT UNITS.
5. PART VALUES AND TYPE NUMBERS IN PARENTHESES ARE USED ON 14-VOLT MODELS ONLY.
6. VALUE OF R326 SELECTED AND INSTALLED DURING FINAL ADJUSTMENT. VALUE APPROXIMATELY 100 OHMS.
7. C322 AND R339 USED ONLY ON 28-VOLT UNITS.

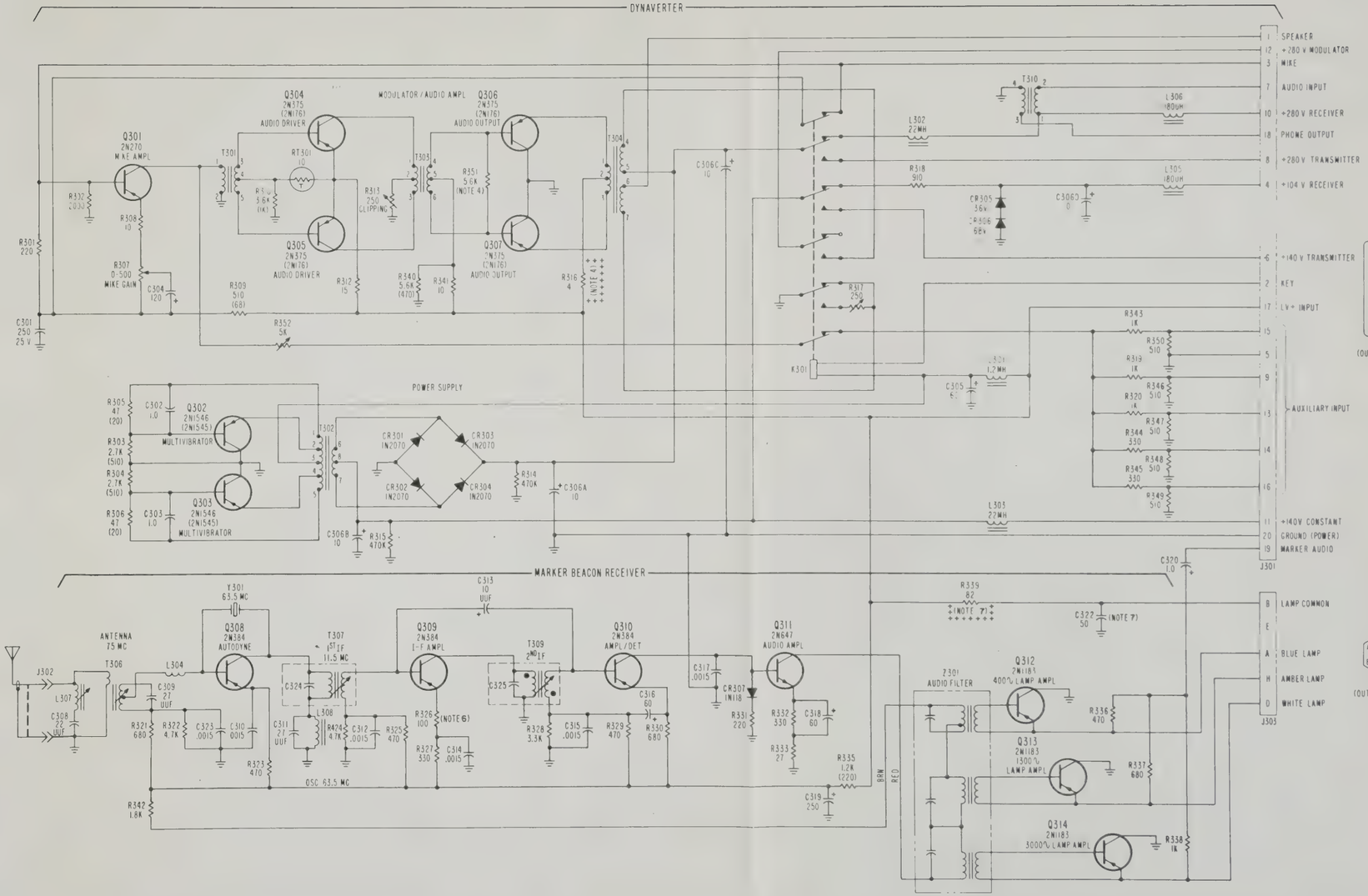
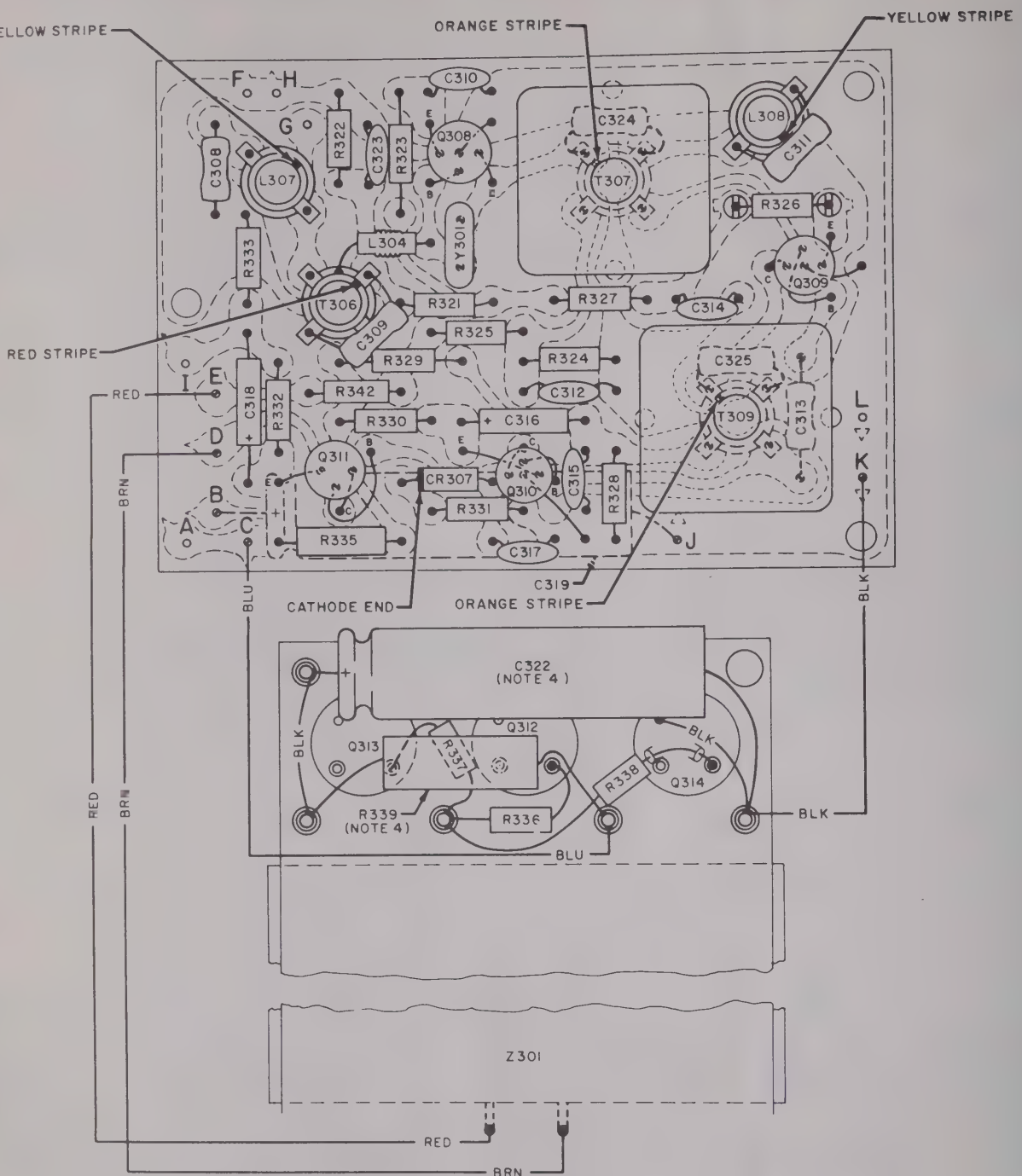


Figure 2-22. Dynaverter, Schematic Diagram



NOTES:

1. FOR SCHEMATIC DIAGRAM SEE FIGURE 2-22.
2. WIRES MARKED WITH COLOR NOTE ARE NO. 24 AWG SINGLE CONDUCTOR SOLID COPPER, TEFLON INSULATED.
3. TRANSPARENT TEFLON TUBING INSTALLED OVER ALL TRANSISTOR LEADS.
4. C322 AND R339 USED ONLY ON 28-VOLT UNITS. JUMPER WIRE CONNECTED BETWEEN TERMINALS OCCUPIED BY R339 ON 14-VOLT UNITS.

Figure 2-23. Dynaverter Marker Beacon Receiver, Wiring Diagram

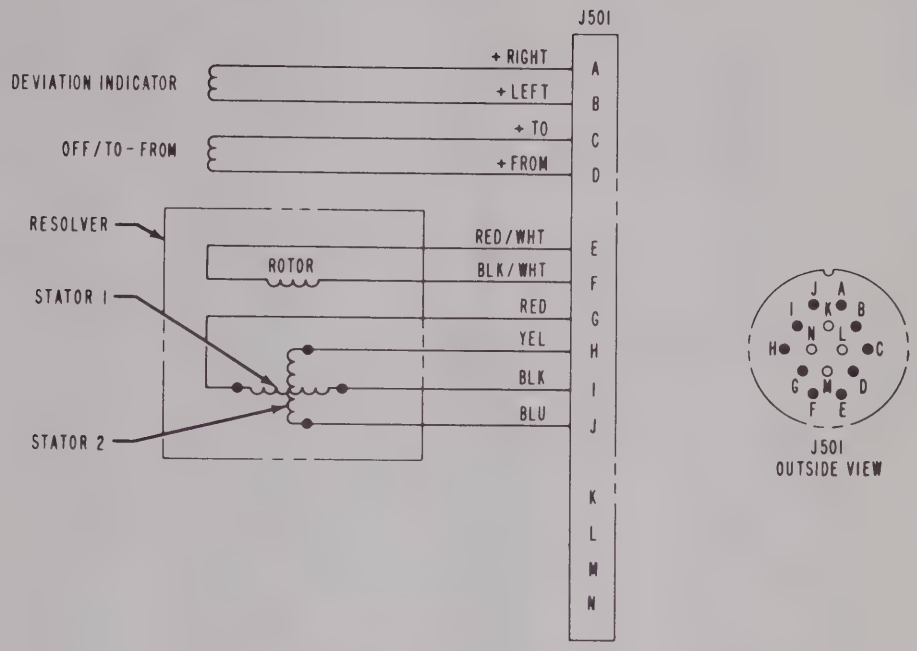
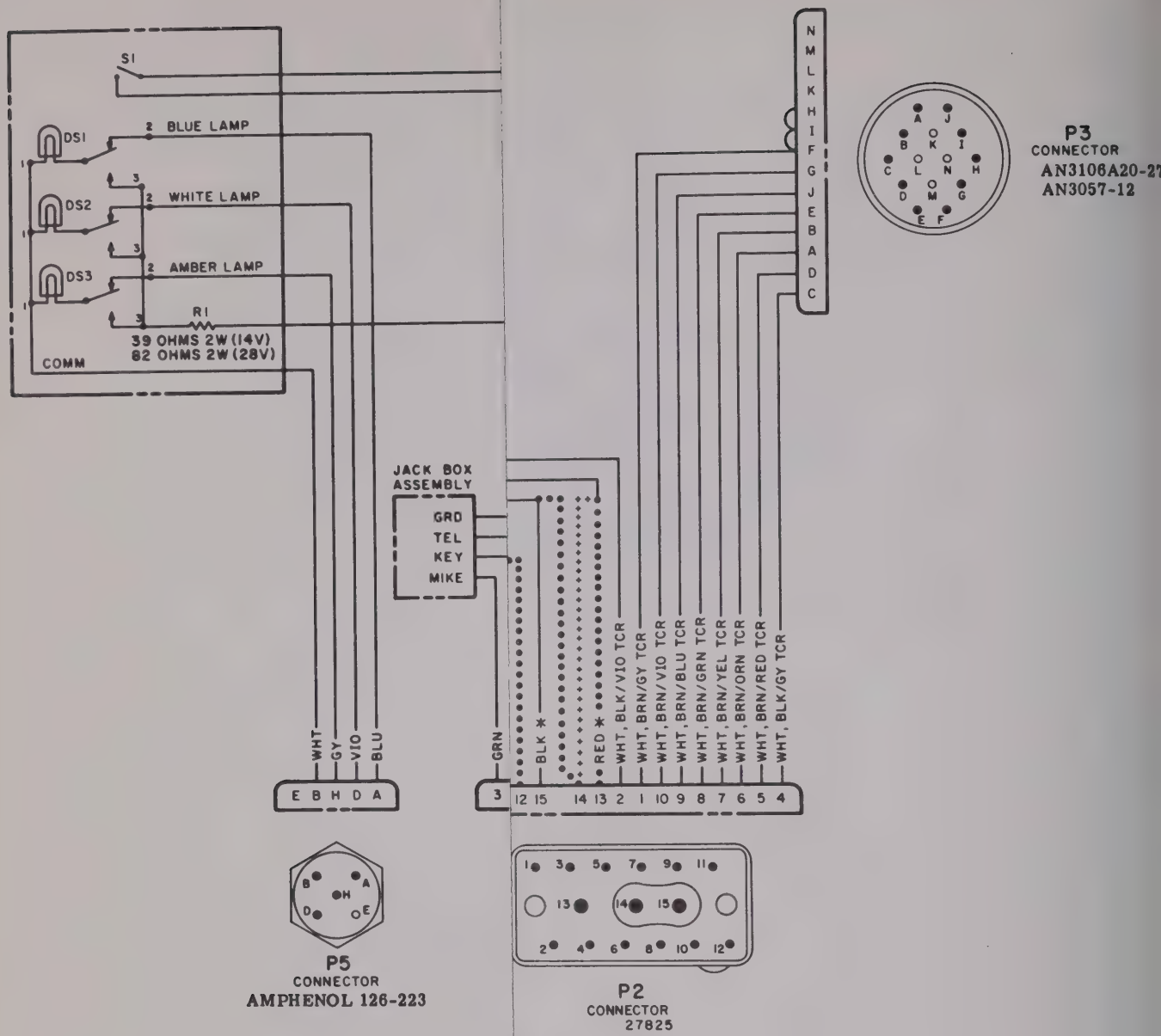


Figure 2-24. Course Indicator, Schematic Diagram



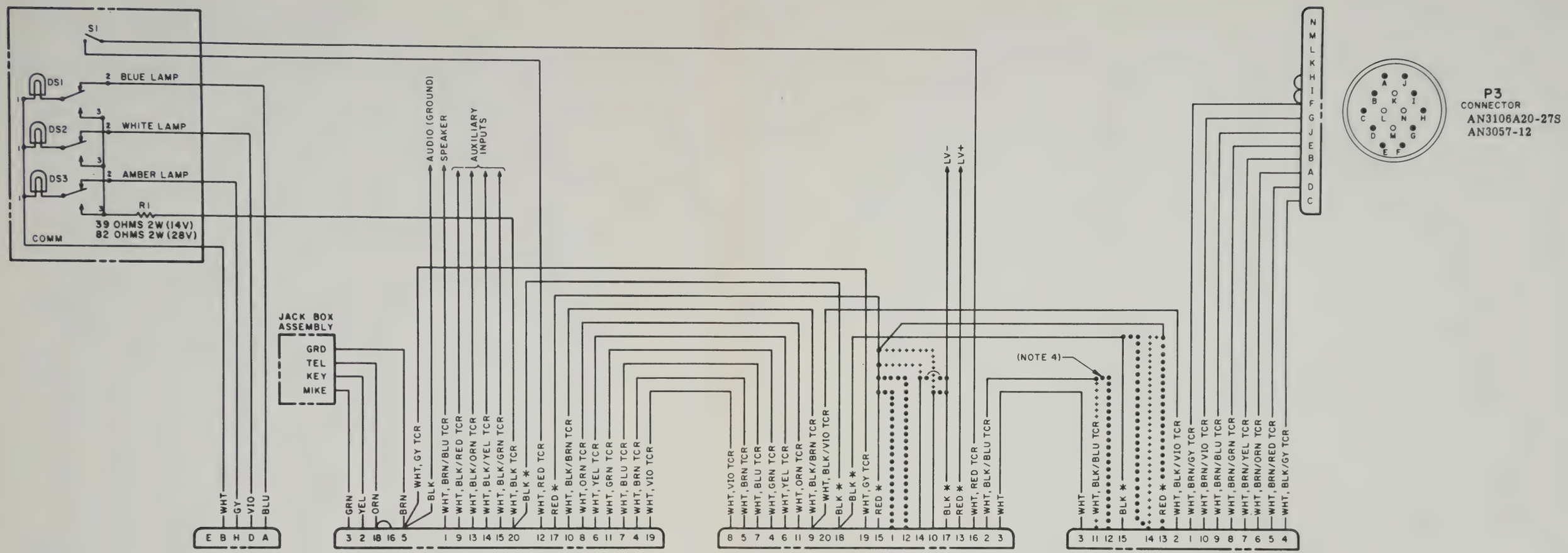
NOTE
IF COMPLETE PLUG IS NEEDED ORDER BY PART NUMBER SHOWN ON DIAGRAM.

Figure 2-25. Bench Test Cable Harness As
Wiring Diagram

Parts List

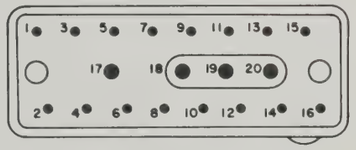
Reference Designation	Description	Part No.
	RECEIVER-TRANSMITTER	
C101	CAPACITOR ASSEMBLY	26730
C102	CAPACITOR, Variable, ceramic, 0.5 - 4.5 uuf capacity range, 500 vdcw	27651-0001
C103	CAPACITOR, Fixed, ceramic, 18 uuf ±5 per cent, 500 vdcw	27697-0180
C104	NOT USED	
C105	CAPACITOR, Fixed, ceramic, 120 uuf ±5 per cent, 500 vdcw	27698-0121
C106	NOT USED	
C107	CAPACITOR, Fixed, ceramic, 560 uuf ±10 per cent, 500 vdcw	EW561
C108	CAPACITOR, Variable, same as C102	
C109	CAPACITOR, Fixed, ceramic, 0.47 uuf ±5 per cent, 500 vdcw	8879-9472
C110	CAPACITOR, Fixed, mica, 220 uuf ±5 per cent, 500 vdcw	VTDM-15-221J
C111	NOT USED	
C112	CAPACITOR, Variable, same as C102	
C113	CAPACITOR, Fixed, ceramic, 15 uuf ±5 per cent, 500 vdcw	27697-0150
C114	CAPACITOR, Fixed, mica, 51 uuf ±5 per cent, 500 vdcw	VTDM-15-510J
C115	CAPACITOR, Fixed, same as C107	
C116	NOT USED	
C117	CAPACITOR, Fixed, same as C107	
C118	NOT USED	
C119	NOT USED	
C120	CAPACITOR, Fixed, ceramic, 2200 uuf ±20 per cent, 500 vdcw	EW222
C121	CAPACITOR, Fixed, ceramic 100 uuf ±5 per cent, 75 vdcw at +125 Deg C, 200 vdcw at +85 Deg C	28651-0101
C122	CAPACITOR, Fixed, same as C120	
C123	CAPACITOR, Fixed, ceramic, (value selected at time of final adjustment)	8791-*
C124	CAPACITOR, Fixed, same as C120	
C125	CAPACITOR, Fixed, same as C121	
C126	CAPACITOR, Fixed, same as C120	
C127	CAPACITOR, Fixed, same as C121	
C128	CAPACITOR, Fixed, ceramic, (value selected at time of final adjustment)	8791-*
C129	CAPACITOR, Fixed, same as C120	
C130	CAPACITOR, Fixed, same as C121	
C131	CAPACITOR, Fixed, ceramic, 1000 uuf ±10 per cent, 500 vdcw	EW102
C132	CAPACITOR, Fixed, ceramic, 8 uuf ±5 per cent, 500 vdcw	27697-9801
C133	CAPACITOR, Fixed, ceramic, 27 uuf ±5 per cent, 500 vdcw	27697-0720
C134	CAPACITOR, Fixed, ceramic, 82 uuf ±5 per cent, 75 vdcw at +125 Deg C, 200 vdcw at +85 Deg C	28651-0820
C135	CAPACITOR, Fixed, ceramic, 4700 uuf ±20 per cent, 500 vdcw	EW472
C136	CAPACITOR, Fixed, ceramic, 71 uuf ±5 per cent, 75 vdcw at +125 Deg C, 200 vdcw at +85 Deg C	28651-0710

* To complete part number, replace asterisk with value in uuf.

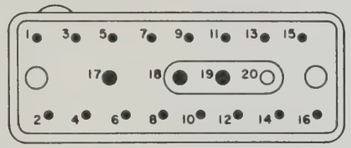


P3
CONNECTOR
AN3106A20-27S
AN3057-12

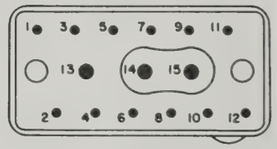
P5
CONNECTOR
AMPHENOL 126-223



P4
CONNECTOR
27827



P1
CONNECTOR
27827



P2
CONNECTOR
27825

AMPHENOL REPLACEMENT INSERT NUMBERS

P1 & P4	126-807
P2	126-150

NOTE
IF COMPLETE PLUG IS NEEDED ORDER BY PART NUMBER SHOWN ON DIAGRAM.

NOTES:
1. UNMARKED WIRES ARE NO. 20 AWG SOLID BARE, TINNED COPPER.
2. WIRES MARKED WITH COLOR NOTE ONLY ARE NO. 22 AWG SINGLE CONDUCTOR STRANDED COPPER, VINYLITE INSULATED.
3. WIRES MARKED WITH COLOR NOTE AND ASTERISK (*) ARE NO. 16 AWG SINGLE CONDUCTOR STRANDED COPPER, VINYLITE INSULATED.
4. FOR 28-VOLT OPERATION WIRES MARKED ++++ ARE USED. FOR 14-VOLT OPERATION WIRES MARKED •••• ARE USED.

Figure 2-25. Bench Test Cable Harness Assembly Wiring Diagram

Parts List

Reference Designation	Description	Part No.
	RECEIVER-TRANSMITTER	
C101	CAPACITOR ASSEMBLY	26730
C102	CAPACITOR, Variable, ceramic, 0.5 - 4.5 uuf capacity range, 500 vdcw	27651-0001
C103	CAPACITOR, Fixed, ceramic, 18 uuf ±5 per cent, 500 vdcw	27697-0180
C104	NOT USED	
C105	CAPACITOR, Fixed, ceramic, 120 uuf ±5 per cent, 500 vdcw	27698-0121
C106	NOT USED	
C107	CAPACITOR, Fixed, ceramic, 560 uuf ±10 per cent, 500 vdcw	EW561
C108	CAPACITOR, Variable, same as C102	
C109	CAPACITOR, Fixed, ceramic, 0.47 uuf ±5 per cent, 500 vdcw	8879-9472
C110	CAPACITOR, Fixed, mica, 220 uuf ±5 per cent, 500 vdcw	VTDM-15-221J
C111	NOT USED	
C112	CAPACITOR, Variable, same as C102	
C113	CAPACITOR, Fixed, ceramic, 15 uuf ±5 per cent, 500 vdcw	27697-0150
C114	CAPACITOR, Fixed, mica, 51 uuf ±5 per cent, 500 vdcw	VTDM-15-510J
C115	CAPACITOR, Fixed, same as C107	
C116	NOT USED	
C117	CAPACITOR, Fixed, same as C107	
C118	NOT USED	
C119	NOT USED	
C120	CAPACITOR, Fixed, ceramic, 2200 uuf ±20 per cent, 500 vdcw	EW222
C121	CAPACITOR, Fixed, ceramic 100 uuf ±5 per cent, 75 vdcw at +125 Deg C, 200 vdcw at +85 Deg C	28651-0101
C122	CAPACITOR, Fixed, same as C120	
C123	CAPACITOR, Fixed, ceramic, (value selected at time of final adjustment)	8791-*
C124	CAPACITOR, Fixed, same as C120	
C125	CAPACITOR, Fixed, same as C121	
C126	CAPACITOR, Fixed, same as C120	
C127	CAPACITOR, Fixed, same as C121	
C128	CAPACITOR, Fixed, ceramic, (value selected at time of final adjustment)	8791-*
C129	CAPACITOR, Fixed, same as C120	
C130	CAPACITOR, Fixed, same as C121	
C131	CAPACITOR, Fixed, ceramic, 1000 uuf ±10 per cent, 500 vdcw	EW102
C132	CAPACITOR, Fixed, ceramic, 8 uuf ±5 per cent, 500 vdcw	27697-9801
C133	CAPACITOR, Fixed, ceramic, 27 uuf ±5 per cent, 500 vdcw	27697-0720
C134	CAPACITOR, Fixed, ceramic, 82 uuf ±5 per cent, 75 vdcw at +125 Deg C, 200 vdcw at +85 Deg C	28651-0820
C135	CAPACITOR, Fixed, ceramic, 4700 uuf ±20 per cent, 500 vdcw	EW472
C136	CAPACITOR, Fixed, ceramic, 71 uuf ±5 per cent, 75 vdcw at +125 Deg C, 200 vdcw at +85 Deg C	28651-0710

* To complete part number, replace asterisk with value in uuf.

Reference Designation	Description	Part No.
	RECEIVER-TRANSMITTER - Continued	
C137	CAPACITOR, Fixed, same as C135	
C138	CAPACITOR, Fixed, same as C135	
C139	CAPACITOR, Fixed, same as C135	
C140	CAPACITOR, Fixed, same as C134	
C141	CAPACITOR, Fixed, same as C136	
C142	CAPACITOR, Fixed, same as C135	
C143	CAPACITOR, Fixed, electrolytic, 2 uf ±20 per cent, 150 vdcw	110D205X0150G0
C144	CAPACITOR, Fixed, same as C121	
C145	CAPACITOR, Fixed, plastic, 0.047 uf ±20 per cent, 300 vdcw	TWA3S47-10
C146	CAPACITOR, Fixed, ceramic, 47 uuf ±5 per cent, 75 vdcw at +125 Deg C, 200 vdcw at +85 Deg C	28651-0470
C147	CAPACITOR, Fixed, mica, 220 uuf ±5 per cent, 500 vdcw	VTDM 15-472J
C148	NOT USED	
C149	CAPACITOR, Fixed, paper, 0.10 uf ±20 per cent, 200 vdcw	27726-9102
C150	CAPACITOR, Variable, glass, 0.5 - 4.5 uuf, 500 vdcw	680076
C151	CAPACITOR, Fixed, ceramic, 100 uuf ±5 per cent, 500 vdcw	27698-0101
C152	CAPACITOR, Fixed, same as C107	
C153	CAPACITOR, Fixed, ceramic, 51 uuf ±5 per cent, 500 vdcw	28608-0510
C154	CAPACITOR, Fixed, same as C107	
C155	CAPACITOR, Fixed, mica, 47 uuf ±5 per cent, 500 vdcw	VTDM15-470J
C156	CAPACITOR, Fixed, ceramic, 27 uuf ±5 per cent, 500 vdcw	27697-0270
C157	CAPACITOR, Fixed, same as C107	
C158	CAPACITOR, Fixed, ceramic, 68 uuf ±5 per cent, 500 vdcw	27697-0680
C159	CAPACITOR, Fixed, ceramic, 6 uuf ±5 per cent, 500 vdcw	27697-9601
C160	CAPACITOR, Fixed, ceramic, 12 uuf ±5 per cent, 500 vdcw	27697-0120
C161	CAPACITOR, Fixed, electrolytic, 1 uf ±20 per cent, 35 vdcw	150D105X0035A2
C162	CAPACITOR, Fixed, paper, 0.022 uf ±20 per cent, 400 vdcw	118P22304S4
C163	CAPACITOR, Fixed, electrolytic, 2 uf ±20 per cent, 150 vdcw	110D205X0150G1
C164	NOT USED	
C165	CAPACITOR, Fixed, paper, 0.047 uf ±20 per cent, 400 vdcw	196P47304S4
C166	CAPACITOR, Fixed, same as C165	
C167	CAPACITOR, Fixed, electrolytic, 0.1 uf ±20 per cent, 35 vdcw	150D104X0035A2
C168	CAPACITOR, Fixed, ceramic, 6800 uuf ±20 per cent, 500 vdcw	EW682
C169	CAPACITOR, Fixed, ceramic, 4700 uuf ±10 per cent, 100 vdcw	GP4-472
C170	CAPACITOR, Fixed, ceramic, 1000 uuf ±20 per cent, 500 vdcw	EW102
C171	CAPACITOR, Fixed, same as C167	
C172	CAPACITOR, Fixed, electrolytic, 4.7 uf ±20 per cent, 35 vdcw	150D475X0035B2
C173	CAPACITOR, Fixed, electrolytic, 2.2 uf ±20 per cent, 35 vdcw	150D225X0035B2

Reference Designation	Description	Part No.
	RECEIVER-TRANSMITTER - Continued	
C174	CAPACITOR, Fixed, ceramic, 560 uuf ±20 per cent, 500 vdcw	EW561
C175	CAPACITOR, Fixed, mica, 100 uuf ±5 per cent, 500 vdcw	VTDM15-101J
C176	CAPACITOR, Fixed, ceramic, 120 uuf ±5 per cent, 500 vdcw	27698-0121
C177	NOT USED	
C178	CAPACITOR, Fixed, ceramic, 8 by .001 uf +100 -0 per cent, 1000 vdcw	6S767
C179	CAPACITOR, Fixed, same as C178	
C180	CAPACITOR, Fixed, same as C178	
C181	CAPACITOR, Fixed, same as C178	
C182	CAPACITOR, Fixed, same as C178	
C183	CAPACITOR, Fixed, same as C178	
C184	CAPACITOR, Fixed, same as C178	
C185	CAPACITOR, Fixed, same as C174	
C186	CAPACITOR, Fixed, ceramic, 4700 uuf ±20 per cent, 500 vdcw	EW472
C187	CAPACITOR, Fixed, same as C107	
C188	CAPACITOR, Fixed, ceramic, 6 uuf ±5 per cent, 500 vdcw	27697-9601
C189	CAPACITOR, Fixed, ceramic, 5 uuf ±5 per cent, 500 vdcw	27697-9501
C190	CAPACITOR, Fixed, ceramic, 7 uuf ±5 per cent, 500 vdcw	27697-9701
C191	CAPACITOR, Fixed, same as C178	
C192	CAPACITOR, Fixed, electrolytic, 4.7 uf ±20 per cent, 35 vdcw	150D475X0035B2
C193	CAPACITOR, Fixed, ceramic, 100 uuf ±5 per cent, 75 vdcw at +125 Deg C, 200 vdcw at +85 Deg C	28651-0101
C194	CAPACITOR, Fixed, same as C193	
C195	CAPACITOR, Fixed, same as C193	
C196	CAPACITOR, Fixed, ceramic, 5 uuf ±5 per cent, 500 vdcw	27696-9501
C197	CAPACITOR, Fixed, ceramic, 120 uuf ±5 per cent, 500 vdcw	27698-0121
C198	CAPACITOR, Fixed, plastic, 0.047 uf ±20 per cent, 300 vdcw	TWA 3S47-10
C199	CAPACITOR, Fixed, same as C107	
C200	NOT USED	
C201	CAPACITOR, Fixed, ceramic (value selected at time of final adjustment between 15-27 uuf)	27697-*
C202	CAPACITOR, Fixed, ceramic, 33 uuf ±5 per cent, 500 vdcw	27697-0330
C203	CAPACITOR, Fixed, ceramic, 2200 uuf ± 20 per cent, 500 vdcw	EW222
C204	CAPACITOR, Fixed, ceramic, 1000 uuf ±10 per cent, 500 vdcw	EW102
C205	CAPACITOR, Variable, ceramic, 0.5 to 4.5 uuf capacity range, 500 vdcw	27651-0001
C206	CAPACITOR, Fixed, ceramic, 560 uuf ±10 per cent, 500 vdcw	EW561
C207	NOT USED	
C208	CAPACITOR, Fixed, same as C206	
C209	NOT USED	
C210	CAPACITOR, Fixed, same as C206	
C211	CAPACITOR, Fixed, same as C206	
C212	CAPACITOR, Fixed, ceramic, 39 uuf ±5 per cent, 500 vdcw	8795-0390

*To complete part number, replace asterisk with value in uuf.

Reference Designation	Description	Part No.
	RECEIVER-TRANSMITTER - Continued	
C213	CAPACITOR, Fixed, same as C206	
C214	CAPACITOR, Fixed, same as C204	
C215	CAPACITOR, Variable, same as C205	
C216	CAPACITOR, Fixed, same as C206	
C217	NOT USED	
C218	CAPACITOR, Fixed, same as C206	
C219	NOT USED	
C220	CAPACITOR, Fixed, same as C206	
C221	CAPACITOR, Fixed, same as C206	
C222	CAPACITOR, Fixed, ceramic, 10 uuf ±5 per cent, 500 vdcw	8795-0100
C223	CAPACITOR, Fixed, same as C206	
C224	CAPACITOR, Fixed, same as C204	
C225	CAPACITOR, Variable, same as C205	
C226	CAPACITOR, Fixed, same as C206	
C227	CAPACITOR, Fixed, same as C206	
C228	CAPACITOR, Fixed, same as C206	
C229	CAPACITOR, Fixed, same as C206	
C230	CAPACITOR, Fixed, ceramic, 15 uuf ±5 per cent, 500 vdcw	8795-0150
C231	CAPACITOR, Variable, same as C205	
C232	CAPACITOR, Fixed, ceramic, 18 uuf ±5 per cent, 500 vdcw	27697-0180
C233	CAPACITOR, Fixed, same as C232	
C234	CAPACITOR, Fixed, ceramic, 22 uuf ±5 per cent, 500 vdcw	27697-0220
C235	CAPACITOR, Fixed, same as C234	
C236	CAPACITOR, Fixed, same as C206	
C237	CAPACITOR, Fixed, same as C206	
C238	CAPACITOR, Fixed, ceramic, 51 uuf ±5 per cent, 500 vdcw	28608-0510
C239	CAPACITOR, Fixed, same as C238	
C240	CAPACITOR, Fixed, same as C232	
C241	CAPACITOR, Fixed, ceramic, 12 uuf ±5 per cent, 500 vdcw	28608-0120
C242	CAPACITOR, Variable, same as C205	
C243	NOT USED	
C244	CAPACITOR, Fixed, ceramic, 120 uuf ±5 per cent, 500 vdcw	27698-0121
C245	CAPACITOR, Fixed, ceramic, 560 uuf ±10 cent, 500 vdcw	EW561
C246	CAPACITOR, Fixed, same as C206	
C247	CAPACITOR, Fixed, ceramic, 6800 uuf ±20 per cent, 500 vdcw	26825-0682
C248	CAPACITOR, Fixed, electrolytic, 1 uf ±20 per cent, 35 vdcw	150D105X0035A2
C249	CAPACITOR, Fixed, ceramic, 2 uuf ±5 per cent, 500 vdcw	8795-9201
C250	CAPACITOR, Fixed, ceramic, 22 uf ±5 per cent, 500 vdcw	27697-0220
C251	CAPACITOR, Fixed, ceramic, 18 uuf ±5 per cent, 500 vdcw	27696-0180
C252	NOT USED	
C253	CAPACITOR, Fixed, ceramic, 4700 uuf ±20 per cent, 500 vdcw	EW472
C254	CAPACITOR, Fixed, same as C203	
C255	CAPACITOR, Fixed, same as C206	
C256	CAPACITOR, Fixed, ceramic, 1 uuf ±5 per cent, 500 vdcw	8795-9101
C300	CAPACITOR, Fixed, ceramic, 2 uuf ±0.25 uuf, 500 vdcw	8791-9201

Reference Designation	Description	Part No.
	RECEIVER-TRANSMITTER - Continued	
C301	CAPACITOR, Fixed, ceramic, 1 uuf ±5 per cent, 500 vdcw	8795-9101
C302	CAPACITOR, Fixed, ceramic, 8 uuf ±5 per cent, 500 vdcw	27697-9801
CR101	DIODE	HD6226
CR102	DIODE, same as CR101	
CR103	NOT USED	
CR104	DIODE, same as CR101	
CR105	DIODE, same as CR101	
CR106	DIODE, same as CR101	
DS101	LAMP, Incandescent, 14v, 0.08 amp, T-1-3/4 bulb, midget flange base, red coated	GE330/R
DS102	LAMP, Incandescent, same as DS101	
FL101	FILTER, Low pass	SMF0-2
FL102	FILTER, Low pass, same as FL101	
FL103	FILTER, Low pass, same as FL101	
FL104	FILTER, Low pass, same as FL101	
J101	CONNECTOR, Receptacle, electrical	27722
J201	CONNECTOR, Receptacle, electrical	28289
K101	RELAY, Armature, nominal voltage, 19.3 v	3S2791G310A7AR
L101	COIL	26718
L102	COIL	28144
L103	COIL	27131
L104	COIL	27018
L105	CHOKE, RF, 2.7 uH ±10 per cent	10100-636
L106	COIL, RF, 1.0 uH ±20 per cent	10100-630
L107	NOT USED	
L108	CHOKE, RF, uH ±20 per cent	10100-630
L109	CHOKE, RF, 3 uH±10 per cent	10100-652
L110	CHOKE, RF, same as L109	
L111	CHOKE, RF, same as L109	
L112	COIL ASSEMBLY, IF	28665-0001
L113	COIL ASSEMBLY, IF, same as L112	
L114	COIL ASSEMBLY, IF, same as L112	
L115	CHOKE, RF, 14 uH ±10 per cent	CF Ir - 7/16
L116	CHOKE, RF, 3.3 MH ±10 per cent	1537-24
L117	CHOKE, RF, same as L116	
L118	CHOKE, RF, same as L116	
L119	CHOKE, RF, same as L116	
L120	CHOKE, RF, same as L116	
L121	CHOKE, RF, same as L116	
L122	CHOKE, RF, same as L116	
L123	CHOKE, RF, same as L116	
L124	CHOKE, RF, same as L116	
L125	CHOKE, RF, same as L116	
L126	CHOKE, RF, same as L116	
L127	CHOKE, RF, same as L116	
L128	CHOKE, RF, 15 uH ±10 per cent	10102-636
L129	CHOKE, RF, 1000 uH ±5 per cent	28876-0102
L130	CHOKE, RF, same as L129	
L131	CHOKE, RF, 0.15 uH ±20 per cent	10100-620
L201	CHOKE, RF, same as L109	
L202	COIL ASSEMBLY	27745

Reference Designation	Description	Part No.
	RECEIVER-TRANSMITTER - Continued	
L203	PRINTED CIRCUIT ASSEMBLY	27741
L204	CHOKE, RF, same as L109	
L205	CHOKE, RF, same as L105	
L206	COIL ASSEMBLY	27746
L207	PRINTED CIRCUIT ASSEMBLY	27737
L208	CHOKE, RF, same as L105	
L209	CHOKE, RF, same as L109	
L210	COIL ASSEMBLY	27747
L211	PRINTED CIRCUIT ASSEMBLY, same as L207	
L212	CHOKE, RF, same as L105	
L213	COIL ASSEMBLY, same as L210	
L214	PRINTED CIRCUIT ASSEMBLY, same as L207	
L215	COIL ASSEMBLY	27749
L216	PRINTED CIRCUIT ASSEMBLY	27733
L217	CHOKE, RF, same as L105	
L218	COIL, RF	30339
P101	CONNECTOR PLUG ASSEMBLY	27728
R101	RESISTOR, Fixed, comp, 470,000 ohms ±10 per cent, 1/4 w	CB4741
R102	RESISTOR, Fixed, comp, 180 ohms ±10 per cent, 1/4 w	CB1811
R103	RESISTOR, Fixed, comp, 27 ohms ±5 per cent,1/2 w	EB2705
R104	RESISTOR, Fixed, comp, 10,000 ohms ±10 per cent,1/4 w	CB1031
R105	RESISTOR, Fixed, comp, 12,000 ohms ±5 per cent, 1 w	GB1235
R106	RESISTOR, Fixed, comp, 330,000 ohms ±10 per cent, 1/4 w	CB3341
R107	RESISTOR, Fixed, comp, 1200 ohms ± 10 per cent, 1/4 w	CB1221
R108	RESISTOR, Fixed, comp, 22,000 ohms ±10 per cent, 1/4 w	CB2231
R109	NOT USED	
R110	RESISTOR, Fixed, comp, 1500 ohms ±10 per cent, 1/4 w	CB1521
R111	RESISTOR, Fixed, comp, 1800 ohms ±10 per cent, 1/4 w	CB1821
R112	RESISTOR, Fixed, comp, 2200 ohms ±10 per cent, 1/4 w	CB2221
R113	NOT USED	
R114	RESISTOR, Fixed, same as R105	
R115	RESISTOR, Fixed, comp, 100,000 ohms ±10 per cent, 1/4 w	CB1041
R116	RESISTOR, Fixed, same as R115	
R117	RESISTOR, Fixed, comp, 820 ohms ±10 per cent, 1/4 w	CB8211
R118	RESISTOR, Fixed, comp, 150,000 ohms ±10 per cent, 1/4 w	CB1541
R119	RESISTOR, Fixed, same as R110	
R120	RESISTOR, Fixed, same as R118	
R121	RESISTOR, Fixed, comp, 680 ohms ±10 per cent, 1/4 w	CB6811
R122	RESISTOR, Fixed, comp, 12,000 ohms ±10 per cent, 1/4 w	CB1231
R123	RESISTOR, Fixed, comp, 68,000 ohms ±5 per cent, 1/2 w	EB6835

Reference Designation	Description	Part No.
	RECEIVER-TRANSMITTER - Continued	
R124	RESISTOR, Fixed, comp, 100,000 ohms ±10 per cent, 1/4 w	CB1041
R125	RESISTOR, Fixed, same as R110	
R126	RESISTOR, Fixed, same as R115	
R127	RESISTOR, Fixed, same as R124	
R128	RESISTOR, Fixed, comp, 270 ohms ±10 per cent, 1/4 w	CB2711
R129	RESISTOR, Variable, comp, 5000 ohms ±30 per cent, 0.3 w	27706-0502
R130	RESISTOR, Fixed, same as R124	
R131	RESISTOR, Fixed, same as R110	
R132	RESISTOR, Fixed, same as R124	
R133	RESISTOR, Fixed, comp, 390 ohms ±10 per cent, 1/4 w	CB3911
R134	RESISTOR, Fixed, same as R112	
R135	RESISTOR, Fixed, comp, (value selected at time of final adjustment)	341*
R136	RESISTOR, Fixed, comp, 68,000 ohms ±10 per cent, 1/4 w	CB6831
R137	RESISTOR, Fixed, comp, 33,000 ohms ±10 per cent, 1/4 w	CB3331
R138	RESISTOR, Fixed, comp, 2700 ohms ±5 per cent, 1/2 w	EB2725
R139	RESISTOR, Fixed, comp, 4700 ohms ±10 per cent, 1/4 w	CB4721
R140	RESISTOR, Fixed, comp, 15,000 ohms ±10 per cent, 1/4 w	CB1531
R141	NOT USED	
R142	NOT USED	
R143	RESISTOR, Fixed, same as R110	
R144	RESISTOR, Fixed, same as R115	
R145	RESISTOR, Fixed, same as R110	
R146	RESISTOR, Fixed, comp, 100,000 ohms ±10 per cent, 1/4 w	CB1041
R147	RESISTOR, Fixed, comp, 68,000 ohms ±10 per cent, 1/4 w	CB6831
R148	RESISTOR, Fixed, comp, 220,000 ohms ±10 per cent, 1/4 w	CB2241
R149	RESISTOR, Fixed, same as R112	
R150	RESISTOR, Fixed, same as R115	
R151	RESISTOR, Fixed, same as R106	
R152	RESISTOR, Fixed, same as R148	
R153	RESISTOR, Fixed, comp, 6800 ohms ±10 per cent, 1/4 w	CB6821
R154	RESISTOR, Variable, comp, two section, 10,000 ohms ±30 per cent, 1/2 w first sect, 5,000 ohms ±30 per cent, 1/4 w second sect.	27705
R155	RESISTOR, Fixed, comp, 1 megohm ±10 per cent, 1/4 w	CB1051
R156	RESISTOR, Fixed, same as R155	
R157	RESISTOR, Fixed, comp, (value selected at time of final adjustment)	341*
R158	RESISTOR, Variable, comp, 250,000 ohms ±30 per cent, supplied with 1 SPST switch	27704-0254
R159	RESISTOR, Fixed, same as R148	
R160	RESISTOR, Fixed, same as R155	
R161	RESISTOR, Fixed, same as R155	
R162	RESISTOR, Fixed, same as R148	
R163	RESISTOR, Fixed, same as R115	
R164	RESISTOR, Fixed, comp, (value selected at time of final adjustment)	341*

*To complete part number, replace asterisk with value in ohms.

Reference Designation	Description	Part No.
	RECEIVER-TRANSMITTER - Continued	
R165	RESISTOR, Fixed, same as R115	
R166	RESISTOR, Fixed, comp, 33,000 ohms ±10 per cent, 1/4 w	CB3331
R167	RESISTOR, Fixed, comp, 47,000 ohms ±10 per cent, 1/4 w	CB4731
R168	RESISTOR, Fixed, comp, 12,000 ohms ±10 per cent, 1/4 w	CB1231
R169	RESISTOR, Fixed, same as R108	
R170	RESISTOR, Fixed, same as R104	
R171	NOT USED	
R172	RESISTOR, Fixed, comp, (value selected at time of final adjustment)	341*
R173	RESISTOR, Fixed, comp, (value selected at time of final adjustment)	341*
R174	RESISTOR, Fixed, comp, 120 ohms ±5 per cent, 1/2 w	EB1215
R175	RESISTOR, Fixed, comp, 120 ohms ±5 per cent, 1 w	GB1215
R176	RESISTOR, Fixed, comp, 560 ohms ±5 per cent, 1/2 w	EB5615
R201	RESISTOR, Fixed, comp, 1000 ohms ±5 per cent, 1/2 w	EB1025
R202	RESISTOR, Fixed, comp, 100 ohms ±5 per cent, 1 w	GB1015
R203	RESISTOR, Fixed, comp, 18,000 ohms ±5 per cent, 1/2 w	EB1835
R204	RESISTOR, Fixed, comp, 3900 ohms ±5 per cent, 1/2 w	EB3925
R205	RESISTOR, Fixed, comp, 100 ohms ±5 per cent, 1/2 w	EB1015
R206	RESISTOR, Fixed, comp, 3600 ohms ±5 per cent, 1/2 w	EB3625
R207	RESISTOR, Fixed, same as R204	
R208	RESISTOR, Fixed, same as R205	
R209	RESISTOR, Fixed, comp, 4700 ohms ±5 per cent, 1/2 w	EB4725
R210	RESISTOR, Fixed, comp, 12,000 ohms ±5 per cent, 1/2 w	EB1235
R211	RESISTOR, Fixed, same as R210	
R212	RESISTOR, Fixed, comp, 220 ohms ±5 per cent, 1/2 w	EB2215
R213	RESISTOR, Fixed, comp, 10,000 ohms ±10 per cent, 1/4 w	CB1031
R214	RESISTOR, Fixed, comp, 100,000 ohms ±10 per cent, 1/4 w	CB1041
R215	RESISTOR, Fixed, same as R214	
R216	NOT USED	
R217	RESISTOR, Fixed, comp, 22,000 ohms ±10 per cent, 1/4 w	CB2231
R218	RESISTOR, Fixed, comp, 5600 ohms ±5 per cent, 1w	GB5625
R219	RESISTOR, Fixed, comp, 1 megohm ±5 per cent, 1/2 w	EB1055
S101	SWITCH, Printed circuit, rotary	27764
S102	SWITCH, Printed circuit, rotary	27763
S103	SWITCH, Sensitive, SPDT, 5 amp 250 vac, 2 amp 30 vdc	8685
S104	SWITCH, Rotary, DPST, part of R158	27704

*To complete part number, replace asterisk with value in ohms.

Reference Designation	Description	Part No.
	RECEIVER-TRANSMITTER - Continued	
S201	SWITCH, Printed circuit, rotary	27765
T101	FILTER ASSEMBLY, 20 mc	28713
T102	COIL	26404
T103	COIL, Same as T102	
T104	COIL	26403
T105	COIL, Same as T104	
T106	COIL	27548
T201	COIL	27748
V101	TUBE	5654
V102	TUBE	5654
V103	TUBE	6922
V104	TUBE	5749
V105	TUBE	5750
V106	TUBE	5749
V107	TUBE	5749
V108	TUBE	5670
V109	TUBE	5814A
V110	TUBE	5751
V201	TUBE	5686
V202	TUBE	5686
V203	TUBE	6688
V204	TUBE	6922
XDS101	LAMPHOLDER	121-7
XDS102	LAMPHOLDER, same as XDS101	
Y101	CRYSTAL, Quartz, 88.176 MC	26207-8817
Y102	CRYSTAL, Quartz, 89.176 MC	26207-8917
Y103	CRYSTAL, Quartz, 90.176 MC	26207-9017
Y104	CRYSTAL, Quartz, 91.176 MC	26207-9117
Y105	CRYSTAL, Quartz, 92.176 MC	26207-9217
Y106	CRYSTAL, Quartz, 93.176 MC	26207-9317
Y107	CRYSTAL, Quartz, 94.176 MC	26207-9417
Y108	CRYSTAL, Quartz, 95.176 MC	26207-9517
Y109	CRYSTAL, Quartz, 96.176 MC	26207-9617
Y110	CRYSTAL, Quartz, 97.176 MC	26207-9717
Y111	CRYSTAL, Quartz, 98.176 MC	26207-9817
Y112	CRYSTAL, Quartz, 99.176 MC	26207-9917
Y113	CRYSTAL, Quartz, 100.176 MC	26207-1001
Y114	CRYSTAL, Quartz, 101.176 MC	26207-1011
Y115	CRYSTAL, Quartz, 102.176 MC	26207-1021
Y116	CRYSTAL, Quartz, 103.176 MC	26207-1031
Y117	CRYSTAL, Quartz, 104.176 MC	26207-1041
Y118	CRYSTAL, Quartz, 105.176 MC	26207-1051
Y119	CRYSTAL, Quartz, 106.176 MC	26207-1061
Y120	CRYSTAL, Quartz, 21.824 MC	26206-2182
Y121	CRYSTAL, Quartz, 21.874 MC	26206-2187
Y122	CRYSTAL, Quartz, 21.924 MC	26206-2192
Y123	CRYSTAL, Quartz, 21.974 MC	26206-2197
Y124	CRYSTAL, Quartz, 22.024 MC	26206-2202
Y125	CRYSTAL, Quartz, 22.074 MC	26206-2207
Y126	CRYSTAL, Quartz, 22.124 MC	26206-2212
Y127	CRYSTAL, Quartz, 22.174 MC	26206-2217
Y128	CRYSTAL, Quartz, 22.224 MC	26206-2222
Y129	CRYSTAL, Quartz, 22.274 MC	26206-2227
Y130	CRYSTAL, Quartz, 22.324 MC	26206-2232
Y131	CRYSTAL, Quartz, 22.374 MC	26206-2237
Y132	CRYSTAL, Quartz, 22.424 MC	26206-2242
Y133	CRYSTAL, Quartz, 22.474 MC	26206-2247

Reference Designation	Description	Part No.
	RECEIVER-TRANSMITTER - Continued	
Y134	CRYSTAL, Quartz, 22.524 MC	26206-2252
Y135	CRYSTAL, Quartz, 22.574 MC	26206-2257
Y136	CRYSTAL, Quartz, 22.624 MC	26206-2262
Y137	CRYSTAL, Quartz, 22.674 MC	26206-2267
Y138	CRYSTAL, Quartz, 22.724 MC	26206-2272
Y139	CRYSTAL, Quartz, 22.774 MC	26206-2277
Y140	CRYSTAL, Quartz, 1.545 MC	19233-1545
Y201	CRYSTAL, Quartz, same as Y109	
Y202	CRYSTAL, Quartz, same as Y110	
Y203	CRYSTAL, Quartz, same as Y111	
Y204	CRYSTAL, Quartz, same as Y112	
Y205	CRYSTAL, Quartz, same as Y113	
Y206	CRYSTAL, Quartz, same as Y114	
Y207	CRYSTAL, Quartz, same as Y115	
Y208	CRYSTAL, Quartz, same as Y116	
Y209	CRYSTAL, Quartz, same as Y117	
Y210	CRYSTAL, Quartz, same as Y118	
Y211	CRYSTAL, Quartz, same as Y119	
Y212	CRYSTAL, Quartz, 107.176 MC	26207-1071
Y213	CRYSTAL, Quartz, 108.176 MC	26207-1081
Y214	CRYSTAL, Quartz, 109.176 MC	26207-1091
Y215	CRYSTAL, Quartz, 110.176 MC	26207-1101
Y216	CRYSTAL, Quartz, 111.176 MC	26207-1111
Y217	CRYSTAL, Quartz, 112.176 MC	26207-1121
Y218	CRYSTAL, Quartz, 113.176 MC	26207-1131
Z101	REACTOR	30167
Z201	FILTER ASSEMBLY, part of J201	28289
Z202	REACTOR	27606
	DYNAVERTER	
C301	CAPACITOR, Fixed, electrolytic, 250 uf, 25 vdcw	BRH10112
C302	CAPACITOR, Fixed, plastic, 1 uf ±10 per cent, 100 vdcw	26053-9101
C303	CAPACITOR, Fixed, same as C302	
C304	CAPACITOR, Fixed, electrolytic, 120 uf ±20 per cent, 10 vdcw	150D127X0010R2
C305	CAPACITOR, Fixed, electrolytic, 60 uf +75 -15 per cent, 50 vdcw	F310
C306	CAPACITOR, Fixed, electrolytic, four section, 10 uf +50 -10 per cent, 450 vdcw ea section	27153
C307	NOT USED	
C308	CAPACITOR, Fixed, ceramic, 22 uuf ±20 cent, 500 vdcw	8791-0220
C309	CAPACITOR, Fixed, ceramic, 27 uuf ±2 per cent, 500 vdcw	8792-0270
C310	CAPACITOR, Fixed, ceramic, 0.0015 uf, 500 vdcw	8625-9154
C311	CAPACITOR, Fixed, same as C309	
C312	CAPACITOR, Fixed, same as C310	
C313	CAPACITOR, Fixed, ceramic, 10 uuf ±2 per cent, 500 vdcw	8791-0100
C314	CAPACITOR, Fixed, same as C310	
C315	CAPACITOR, Fixed, same as C310	
C316	CAPACITOR, Fixed, electrolytic, 60 uf ±20 per cent, 6 vdcw	150D606X0006B2

Reference Designation	Description	Part No.
	DYNAVERTER - Continued	
C317	CAPACITOR, Fixed, same as C310	
C318	CAPACITOR, Fixed, same as C316	
C319	CAPACITOR, Fixed, electrolytic, 250 uf +100 -10 per cent, 12 vdcw	30D157
C320	CAPACITOR, Fixed, electrolytic, 1 uf ±20 per cent, 35 vdcw	150D105X0035A2
C321	NOT USED	
C322	CAPACITOR, Fixed, electrolytic, 50 uf +100 -10 per cent, 50 vdcw (used in 28 v model only)	30D200A1
C323	CAPACITOR, Fixed, same as C310	
C324	CAPACITOR, Fixed, ceramic, 51 uuf ±2 per cent, 500 vdcw	8792-0510
C325	CAPACITOR, Fixed, same as C324	
CR301	DIODE	IN2070
CR302	DIODE, same as CR301	
CR303	DIODE, same as CR301	
CR304	DIODE, same as CR301	
CR305	DIODE	IN1826
CR306	DIODE	IN1833
CR307	DIODE	IN118
J301	CONNECTOR, Receptacle, electrical	126-806
J302	CONNECTOR, Receptacle,	UG290A/U
J303	CONNECTOR, Receptacle, electrical	126-218
K301	RELAY, Armature, 14 v (used in 14 v model)	25722-0014
K301	RELAY, Armature, 28 v (used in 28 v model)	25722-0028
L301	REACTOR, 1.2 mh	L2254
L302	COIL, RF, 22 mh	05.22
L303	COIL, Same as L302	
L304	COIL, RF	27410
Q301	TRANSISTOR	2N270
Q302	TRANSISTOR, Type 2N1545 (used in 14 v model)	26775-0007
Q302	TRANSISTOR, Type 2N1546 (used in 28 v model)	26775-0008
Q303	TRANSISTOR, Type 2N1545 (used in 14 v model)	26775-0007
Q303	TRANSISTOR, Type 2N1546 (used in 28 v model)	26775-0008
Q304	TRANSISTOR, (used in 14 v model)	2N176
Q304	TRANSISTOR, (used in 28 v model)	2N375
Q305	TRANSISTOR, same as Q304	
Q306	TRANSISTOR, same as Q304	
Q307	TRANSISTOR, same as Q304	
Q308	TRANSISTOR	2N384
Q309	TRANSISTOR, same as Q308	
Q310	TRANSISTOR, same as Q308	
Q311	TRANSISTOR	2N647
Q312	TRANSISTOR	2N1183
Q313	TRANSISTOR, same as Q312	
Q314	TRANSISTOR, same as Q312	
R301	RESISTOR, Fixed, comp, 220 ohms ±5 per cent, 1/2 w	EB2215
R302	RESISTOR, Fixed, comp, 2000 ohms ±5 per cent, 1/2 w	EB2025
R303	RESISTOR, Fixed, comp, 510 ohms ±5 per cent, 1 w (used in 14 v model)	GB5115
R303	RESISTOR, Fixed, comp, 2700 ohms ±5 per cent, 1 w	GB2725

Reference Designation	Description	Part No.
	DYNAVERTER - Continued	
R304	RESISTOR, Fixed, same as R303	
R305	RESISTOR, Fixed, comp, 20 ohms ±5 per cent, 1/2 w	EB2005
R305	RESISTOR, Fixed, comp, 47 ohms ±5 per cent, 1/2 w	EB4705
R306	RESISTOR, Fixed, same as R305	
R307	RESISTOR, Variable, comp, 500 ohms ±20 per cent, 1/2 w	65LT501
R308	RESISTOR, Fixed, comp, 10 ohms ±5 per cent, 1/2 w	EB1005
R309	RESISTOR, Fixed, comp, 33 ohms ±5 per cent, 1/2 w (used in 14 v model)	EB3305
R309	RESISTOR, Fixed, comp, 510 ohms ±5 per cent, 1/2 w (used in 28 v model)	EB5115
R310	RESISTOR, Fixed, comp, 1000 ohms ±5 per cent, 1/2 w (used in 14 v model)	EB1025
R310	RESISTOR, Fixed, comp, 5100 ohms ±5 per cent, 1/2 w (used in 28 v model)	EB5125
R311	NOT USED	
R312	RESISTOR, Fixed, comp, 15 ohms ±5 per cent, 1 w	GB1505
R313	RESISTOR, Variable, comp, 250 ohms ±20 per cent, 1 w	90LT251
R314	RESISTOR, Fixed, comp, 470, 000 ohms ±5 per cent, 1/2 w	EB4745
R315	RESISTOR, Fixed, same as R314	
R316	RESISTOR, Fixed, ww, 4 ohms ±3 per cent, 25 w (used only in 28 v model)	RH25-4H
R317	RESISTOR, Variable, comp, 100 ohms ±20 per cent, 1 w	90LT101
R318	RESISTOR, Fixed, comp, 910 ohms ±5 per cent, 2 w	HB9115
R319	RESISTOR, Fixed, comp, 1000 ohms ±5 per cent, 1/2 w	EB1025
R320	RESISTOR, Fixed, same as R319	
R321	RESISTOR, Fixed, comp, 680 ohms ±10 per cent, 1/4 w	CB6811
R322	RESISTOR, Fixed, comp, 4700 ohms ±10 per cent, 1/4 w	CB4721
R323	RESISTOR, Fixed, comp, 470 ohms ±10 per cent, 1/4 w	CB4711
R324	RESISTOR, Fixed, same as R322	
R325	RESISTOR, Fixed, same as R323	
R326	RESISTOR, Fixed, comp (value selected at time of final adjustment)	200-*
R327	RESISTOR, Fixed, comp, 330 ohms ±10 per cent, 1/4 w	CB3311
R328	RESISTOR, Fixed, comp, 3300 ohms ±10 per cent, 1/4 w	CB3321
R329	RESISTOR, Fixed, same as R323	
R330	RESISTOR, Fixed, same as R321	
R331	RESISTOR, Fixed, comp, 220 ohms ±10 per cent, 1/4 w	CB2211
R332	RESISTOR, Fixed, same as R327	
R333	RESISTOR, Fixed, comp, 150 ohms ±10 per cent, 1/4 w	CB1511
R334	NOT USED	
R335	RESISTOR, Fixed, comp, 220 ohms ±5 per cent, 1/2 w (used in 14 v model)	EB2215
R335	RESISTOR, Fixed, comp, 1200 ohms ±5 per cent, 1/2 w (used in 28 v model)	EB1225

*To complete part number, replace asterisk with value in ohms.

Reference Designation	Description	Part No.
	DYNAVERTER - Continued	
R336	RESISTOR, Fixed, same as R323	
R337	RESISTOR, Fixed, same as R321	
R338	RESISTOR, Fixed, comp, 1000 ohms ±10 per cent, 1/4 w	CB1021
R339	RESISTOR, Fixed, comp, 82 ohms ±5 per cent, 2 w (used only in 28 v model)	HB8205
R340	RESISTOR, Fixed, comp, 470 ohms ±5 per cent, 1 w	GB4715
R341	RESISTOR, Fixed, comp, 10 ohms ±5 per cent, 1 w	GB1005
R342	RESISTOR, Fixed, comp, 1800 ohms ±10 per cent, 1/4 w	CB1821
R343	RESISTOR, Fixed, same as R319	
R344	RESISTOR, Fixed, comp, 330 ohms ±5 per cent, 1/2 w	EB3315
R345	RESISTOR, Fixed, same as R344	
R346	RESISTOR, Fixed, comp, 510 ohms ±5 per cent, 1/2 w	EB5115
R347	RESISTOR, Fixed, same as R346	
R348	RESISTOR, Fixed, same as R346	
R349	RESISTOR, Fixed, same as R346	
R350	RESISTOR, Fixed, same as R346	
R351	RESISTOR, Fixed, comp, 5600 ohms ±5 per cent, 1 w	GB5625
R352	RESISTOR, Variable, comp, 5000 ohms ±30 per cent, 0.3 w	27706-0502
RT301	RESISTOR, Thermal, 10 ohms ±10 per cent	11-TE2
T301	TRANSFORMER, Audio	AR-817
T302	TRANSFORMER, (used in 14 v model)	26484
T302	TRANSFORMER, (used in 28 v model)	26485
T303	TRANSFORMER, Audio driver	AR-816
T304	TRANSFORMER, Modulation (used in 14 v model)	AR-818
T304	TRANSFORMER, Modulation (used in 28 v model)	AR-819
T305	TRANSFORMER	27418
T306	TRANSFORMER	27405
T307	TRANSFORMER	27406
T308	TRANSFORMER, Same as T305	
T309	TRANSFORMER, Same as T307	
T310	TRANSFORMER, Audio	4532
W301	CABLE, Radio frequency	9522
W302	CABLE, Radio frequency, same as W301	
W303	CABLE, Radio frequency, same as W301	
Y301	CRYSTAL, Quartz, 63.5 MC	19658-6350
Z301	FILTER, Audio	28405
	CONVERTER	
C401	CAPACITOR, Fixed, mica, 1000 uuf ±5 per cent, 500 vdcw	27513-0102
C402	CAPACITOR, Fixed, mica, 0.01 uf ±1 per cent, 300 vdcw	DM19-103
C403	CAPACITOR, Fixed, mica, 2200 uuf ±5 per cent, 500 vdcw	27513-0222

Reference Designation	Description	Part No.
	DYNAVERTER - Continued	
C404	CAPACITOR, Fixed, electrolytic, 4 section, 10 uf +50 -10 per cent, 450 vdcw ea section	27153
C405	CAPACITOR, Same as C402	
C406	CAPACITOR, Same as C402	
C407	CAPACITOR, Same as C402	
C408	CAPACITOR, Fixed, plastic, 0.1 uf ±10 per cent, 400 vdcw	26055-9102
C409	CAPACITOR, Same as C402	
C410	CAPACITOR, Fixed, mica, 0.01 uf ±1 per cent, 500 vdcw	27156-0103
C411	CAPACITOR, Same as C408	
C412	CAPACITOR, Same as C404	
C413	CAPACITOR, Same as C402	
C414	CAPACITOR, Fixed, plastic, 1 uf ±10 per cent, 100 vdcw	26053-9101
C415	CAPACITOR, Fixed, electrolytic, 1000 uf, 10 vdcw	DES1000
C416	CAPACITOR, Fixed, paper, 0.047 uf ±5 per cent, 100 vdcw	26054-9473
C417	CAPACITOR, Fixed, mica, 150 uuf ±5 per cent, 500 vdcw	DM15-150
C418	CAPACITOR, Same as C416	
C419	CAPACITOR, Same as C401	
C420	CAPACITOR, Same as C408	
C421	CAPACITOR, Fixed, electrolytic, 10 uf +75 -15 per cent, 100 vdcw	109D106C7100F2
C422	CAPACITOR, Fixed, paper, 0.068 uf ±5 per cent, 100 vdcw	26054-9683
C423	CAPACITOR, Fixed, mica, 0.01 uf ±1 per cent, 500 vdcw	DM35
C424	CAPACITOR, Same as C414	
C425	CAPACITOR, Fixed, paper, 1 uf ±5 per cent, 100 vdcw	26054-9101
C426	CAPACITOR, Fixed, paper, 0.68 uf ±5 per cent, 100 vdcw	26054-9682
C427	CAPACITOR, Fixed, electrolytic, 100 uf +100 -10 per cent, 3 vdcw	40D114A2
C428	CAPACITOR, Fixed, plastic, 0.22 uf ±20 per cent, 50 vdcw	601PE2230R54
C429	CAPACITOR, Fixed, electrolytic, 250 uf +30 -10 per cent, 3 vdcw	40D118A2
CR401	DIODE	HD6226
CR402	DIODE, same as CR401	
CR403	DIODE, same as CR401	
CR404	DIODE, same as CR401	
CR405	DIODE,	IN118
CR406	DIODE, same as CR405	
CR407	DIODE	IN2610
CR408	DIODE, same as CR407	
CR409	DIODE, same as CR401	
CR410	DIODE, same as CR405	
CR411	DIODE, same as CR405	
J401	CONNECTOR, Receptacle, electrical	126-151
K401	RELAY, Armature	29626-0014
L401	REACTOR	AF-938
R401	RESISTOR, Fixed, comp, 47,000 ohms ±5 per cent, 1/2 w	EB4735

Reference Designation	Description	Part No.
	DYNAVERTER - Continued	
R402	RESISTOR, Fixed, comp, 2.2 megohms ±5 per cent, 1/2 w	EB2255
R403	RESISTOR, Fixed, same as R401	
R404	RESISTOR, Fixed, comp, 1500 ohms ±5 per cent, 1/2 w	EB1525
R405	RESISTOR, Fixed, comp, 27,000 ohms ±5 per cent, 1w	GB2735
R406	RESISTOR, Fixed, film, 332,000 ohms ±1 per cent, 2 w	DA-4B3323F
R407	RESISTOR, Fixed, film, 46,400 ohms ±1 per cent, 1/2 w	CD1/2PR46400F
R408	RESISTOR, Fixed, same as R407	
R409	RESISTOR, Fixed, film, 1 megohm ±1 per cent, 1/2 w	CD1/2PR105F
R410	RESISTOR, Fixed, comp, 1000 ohms ±5 per cent, 1/2 w	EB1025
R411	RESISTOR, Fixed, comp, 1800 ohms ±5 per cent, 1/2 w	EB1825
R412	RESISTOR, Fixed, comp, 56,000 ohms ±5 per cent, 1 w	GB5635
R413	RESISTOR, Fixed, comp, 2,200 ohms ±5 per cent, 1/4 w	CB2225
R414	RESISTOR, Fixed, comp, 1 megohm ±5 per cent, 1/4 w	CB1055
R415	RESISTOR, Fixed, comp, 220 ohms ±5 per cent, 1/2 w	EB2215
R416	RESISTOR, Fixed, comp, 3300 ohms ±5 per cent, 1/2 w	EB3325
R417	RESISTOR, Fixed, comp, 33,000 ohms ±5 per cent, 1 w	GB3335
R418	RESISTOR, Fixed, comp, 1000 ohms ±5 per cent, 1/4 w	CB1025
R419	RESISTOR, Fixed, comp, (value selected at time of final adjustment)	201-*
R420	RESISTOR, Fixed, film, 518,000 ohms ±1 per cent, 1/2 w	28255-5185
R421	RESISTOR, Fixed, same as R410	
R422	RESISTOR, Fixed, comp, 2700 ohms ±5 per cent, 1/2 w	EB2725
R423	RESISTOR, Fixed, comp, 100,000 ohms ±5 per cent, 1/2 w	EB1045
R424	RESISTOR, Fixed, comp, 4700 ohms ±5 per cent, 1/4 w	CB4725
R425	RESISTOR, Fixed, same as R409	
R426	RESISTOR, Fixed, comp, 2000 ohms ±5 per cent, 1/2 w	EB2025
R427	RESISTOR, Fixed, same as R423	
R428	RESISTOR, Fixed, film, 681,000 ohms ±1 per cent, 1/2 w	CD1/2PR6813F
R429	RESISTOR, Fixed, comp, 15,000 ohms ±5 per cent, 2 w	HB1535
R430	RESISTOR, Fixed, film, 221,000 ohms ±1 per cent, 2 w	DA-4B2213F
R431	RESISTOR, Fixed, same as R418	
R432	RESISTOR, Fixed, film, 1500 ohms ±1 per cent, 1/2 w	CD1/2PR152F
R433	RESISTOR, Fixed, film, 221 ohms ±1 per cent, 1/2 w	CD1/2PF221F
R434	RESISTOR, Fixed, same as R433	
R435	RESISTOR, Fixed, same as R432	
R436	RESISTOR, Fixed, same as R418	

*To complete part number, replace asterisk with value in ohms.

Reference Designation	Description	Part No.
	DYNAVERTER - Continued	
R437	RESISTOR, Fixed, comp, (value selected at time of final adjustment, between470 - 820 ohms)	341-*
R438	RESISTOR, Variable, comp, 100 ohms ±20 per cent, 1/2 w	65LT101M
R439	RESISTOR, Fixed, film, 464,000 ohms ±1 per cent, 1/2 w	CD1/2PR4643F
R440	RESISTOR, Fixed, film, 221,000 ohms ±1 per cent, 1/2w	CD1/2PR2213F
R441	RESISTOR, Fixed, film, 392,000 ohms ±1 per cent, 1/2w	CD1/2PR3923F
R442	RESISTOR, Fixed, comp, 220,000 ohms ±5 per cent, 1/2w	EB2245
R443	RESISTOR, Fixed, same as R423	
R444	RESISTOR, Fixed, same as R411	
R445	RESISTOR, Fixed, same as R412	
R446	RESISTOR, Fixed, same as R413	
R447	RESISTOR, Fixed, comp, 1 megohm ±5 per cent, 1/2 w	EB1055
R448	RESISTOR, Fixed, same as R415	
R449	RESISTOR, Fixed, comp, 10,000 ohms ±5 per cent, 1w	GB1035
R450	RESISTOR, Fixed, same as R418	
R451	RESISTOR, Fixed, comp, 15,000 ohms ±5 per cent, 1 w	GB1035
R452	RESISTOR, Fixed, comp, 5600 ohms ±5 per cent, 1/2 w	EB5625
R453	RESISTOR, Variable, comp, 50,000 ohms ±20 per cent, 1/2 w	65LT503M
R454	RESISTOR, Fixed, film, 82,500 ohms ±1 per cent, 1/2 w	CD1/2PR8252F
R455	RESISTOR, Fixed, same as R410	
R456	RESISTOR, Fixed, comp, (value selected at time of final adjustment, between 1500 - 10,000 ohms)	201-*
R457	RESISTOR, Fixed, same as R412	
R458	RESISTOR, Fixed, same as R409	
R459	RESISTOR, Fixed, comp, 1.2 megohms ±5 per cent, 1/2 w	EB1255
R460	RESISTOR, Fixed, comp, 33,000 ohms ±5 per cent, 1/2 w	EB3335
R461	RESISTOR, Fixed, same as R418	
R462	RESISTOR, Fixed, comp, 27,000 ohms ±5 per cent, 2 w	HB2735
R463	RESISTOR, Fixed, comp, 4700 ohms ±5 per cent, 1/2 w	EB4725
R464	RESISTOR, Fixed, film, 5620 ohms ±1 per cent, 1/2 w	CD1/2PR5621F
R465	RESISTOR, Variable, comp, 2500 ohms ±20 per cent, 1/2 w	65LT252M
R466	RESISTOR, Fixed, same as R464	
R467	RESISTOR, Fixed, comp, (value selected at time of final adjustment, between 1800 - 6800 ohms)	201-*
R468	RESISTOR, Fixed, comp, 3,000 ohms ±5 per cent, 1/2 w	EB3025
R469	RESISTOR, Fixed, same as R439	
R470	RESISTOR, Fixed, comp, (value selected at time of final adjustment, between 1000 - 30,000 ohms)	201-*
R471	RESISTOR, Fixed, film, 13,000 ohms ±1 per cent, 1/2 w	CD1/2PR133M

*To complete part number, replace asterisk with value in ohms.

Reference Designation	Description	Part No.
	DYNAVERTER - Continued	
R472	RESISTOR, Fixed, ww, 2 ohms ±10 per cent, 2 w	C5-2A
R473	RESISTOR, Fixed, ww, 71 ohms ±3 per cent 3 w	RS-2-710H
R474	RESISTOR, Fixed, same as R472	
R475	RESISTOR, Fixed, ww, 90 ohms ±3 per cent, 3 w	RS-2-900H
T401	TRANSFORMER, Discriminator	25917
T402	TRANSFORMER	26447
V401	TUBE	5670
V402	TUBE	5670
V403	TUBE	5751
V404	TUBE	5670
V405	TUBE	5670

* To complete part number, replace asterisk with value in ohms.

Figure & Index No.	Part No.	1 2 3 4 5 6 Description	Units per Assy
		RECEIVER-TRANSMITTER	
2-26-	24650	RECEIVER-TRANSMITTER ASSEMBLY, Mechanical parts	1
-1	31070	. KNOB ASSEMBLY	1
		(ATTACHING PARTS)	
-2	Comm	. SCREW, Machine, 3-48 by 1/8 lg	1
-2	Comm	. SCREW, Machine, 3-48 by 3/4 lg	1
-3	Comm	. SETSCREW, Fluted, 4-40 by 3/16 lg	2
		---*---	
-4	27096	. DIAL	1
		(ATTACHING PARTS)	
-5	Comm	. SETSCREW, Fluted 4-40 by 3/16 lg	2
		---*---	
-6	26873	. KNOB	1
		(ATTACHING PARTS)	
-7	Comm	. SETSCREW, Fluted, 4-40 by 1/8 lg	2
		---*---	
-8	26876	. KNOB	1
		(ATTACHING PARTS)	
-9	Comm	. SETSCREW, Fluted 4-40 by 1/4 lg	2
		---*---	
-10	26989	. KNOB	1
		(ATTACHING PARTS)	
-11	Comm	. SETSCREW, Fluted 4-40 by 1/8 lg	2
-12	13527	. WASHER, Spring tension	1
		---*---	
-13	31073	. KNOB	1
		(ATTACHING PARTS)	
-14	113-0048	. SCREW, Machine, 3-48 by 3/4 lg	1
-15	Comm	. SETSCREW, Fluted 4-40 by 3/16 lg	2
		---*---	
-16	27015	. DIAL	1
		(ATTACHING PARTS)	
-17	Comm	. SETSCREW, Fluted 4-40 by 3/16 lg	2
		---*---	
-18	31076	. PLATE ASSEMBLY, Front	1
		(ATTACHING PARTS)	
-19	Comm	. SCREW, Machine 3-48 by 1/4 lg	4
		---*---	
-20	27942	. PANEL ASSEMBLY	1
		(ATTACHING PARTS)	
-21	Comm	. SCREW 3-48 by 5/16 lg	4
-22	Comm	. SETSCREW, Fluted, 3-48 by 3/16 lg	8
-23	Comm	. SETSCREW, Fluted, 3-48 by 3/32 lg	3
		---*---	
-24	27679	. . CAM	2
		(ATTACHING PARTS)	
-25	Comm	. . SETSCREW, Fluted, 3-48 by 3/32 lg	4
		---*---	
-26	26869	. . PLATE ASSEMBLY	1
-26A	26870	. . PLATE ASSEMBLY	1
		(ATTACHING PARTS)	
-27	5100-25W	. . RING, Retaining	2
-28	Comm	. . SCREW, Assembled washer, 3-48 by 3/16 lg	8
		---*---	
-29	16088	. . WASHER, Flat	2
-30	2670	. . WASHER, Flat	2
-31	13110	. . WASHER, Flat	2
-32	26885	. . GEAR, Spur	2
		(ATTACHING PARTS)	
-33	Comm	. . SETSCREW, Fluted 3-48 by 1/8 lg	4
		---*---	

Figure & Index No.	Part No.	1 2 3 4 5 6 Description	Units per Assy
		RECEIVER-TRANSMITTER - Continued	
2-26-34	10643	. . WASHER, Flat,	4
-35	1005	. . WASHER, Spring tension	2
-36	26886	. . GEAR, Spur	4
		(ATTACHING PARTS)	
-37	Comm	. . SETSCREW, Fluted, 3-48 by 1/8 lg	8
		---*---	
-38	26782	. . SHAFT	1
-39	26784	. . SHAFT	1
-40	16088	. . WASHER, Flat	2
-41	5103-37-MD	. . RING, Retaining	2
-42	2670	. . WASHER, Flat	2
-43	26882	. . SHAFT	2
-44	26871	. . SHAFT	2
-45	26885	. . GEAR, Spur	2
		(ATTACHING PARTS)	
-46	Comm	. . SETSCREW, Fluted, 3-48 by 1/8 lg.	4
		---*---	
-47	27677	. . SPRING, Helical, extension	2
-48	27676	. . STRAP ASSEMBLY	2
		(ATTACHING PARTS)	
-49	5100-12-C	. . RING, Retaining	2
-50	6376	. . WASHER, Flat	2
		---*---	
-51	27678	. . CAM	2
		(ATTACHING PARTS)	
-52	Comm	. . SETSCREW, Fluted, 3-48 by 3/16 lg	4
		---*---	
-53	26785	. . SHAFT	1
-54	26783	. . SHAFT	1
-55	330/R	. . LAMP, 14 v	2
-56		. . COLLAR (supplied with lampholder)	2
-57	4032-000	. . LAMPHOLDER	2
		(ATTACHING PARTS)	
-58		. . NUT	2
-59		. . WASHER, Lock.	2
-60		. . WASHER, Flat	2
		---*---	
-61	27705	. . RESISTOR, Variable, comp, two sect., 10,000 ohms ±30 per cent, 1/2 w first sect., 5000 ohms ±30 per cent, 1/4 w second sect.	1
		(ATTACHING PARTS)	
-62		. . NUT, Hexagon, 3/8-32	1
-63		. . WASHER, Lock	1
		---*---	
-64	27704-0254	. . RESISTOR, Variable, comp, 250,000 ohms ±30 per cent	1
		(ATTACHING PARTS)	
-65		. . NUT, Hexagon	1
-66		. . WASHER, Lock	1
		---*---	
-67	26884	. . PANEL ASSEMBLY	1
-68	26835	. GEAR, Spur	1
-69	27677	. SPRING, Helical, extension	2
-70	27676	. STRAP ASSEMBLY	2
		(ATTACHING PARTS)	
-71	5100-12-C	. RING, Retaining	2
-72	6376	. WASHER, Flat	2
		---*---	

Figure & Index No.	Part No.	1 2 3 4 5 6 Description	Units per Assy
		RECEIVER-TRANSMITTER - Continued	
2-26-73	27764	. PRINTED CIRCUIT ASSEMBLY	1
		(ATTACHING PARTS)	
-74	Comm	. SCREW, Assembled washer, 4-40 by 1/4 lg	1
-75	Comm	. SCREW, 4-40 by 5/16 lg	1
-76	Comm	. SCREW, 4-40 by 5/16 lg	1
-77	14680	. WASHER, Spring tension	1
		---*---	
-78	26279	. . CONTACT	2
-79	27645	. . HUB ASSEMBLY	1
		(ATTACHING PARTS)	
-80	26296	. . CLIP	1
		---*---	
-81	26843	. . GEAR ASSEMBLY	1
-82	26207-*	. . CRYSTAL, Quarts (to complete part number replace asterisk with frequency in MC)	19
-83	27057	. . PRINTED CIRCUIT BOARD SUBASSEMBLY	1
-84	27763	. PRINTED CIRCUIT ASSEMBLY.	1
		(ATTACHING PARTS)	
-85	Comm	. SCREW, Assembled washer, 4-40 by 1/4 lg	1
-86	Comm	. SCREW, 4-40 by 3/8 lg	1
-87	14680	. WASHER, Spring tension	1
-88	Comm	. SCREW, 4-40 by 5/16 lg	1
-89	14680	. WASHER, Spring tension	1
		---*---	
-90	26279	. . CONTACT	2
-91	26533	. . HUB ASSEMBLY	1
		(ATTACHING PART)	
-92	26296	. . CLIP	1
		---*---	
-93	26842	. . GEAR ASSEMBLY	1
-94	26206-*	. . CRYSTAL, Quartz (to complete part number replace asteriak with frequency in MC)	20
-95	26990	. . PRINTED CIRCUIT BOARD SUBASSEMBLY	1
-96	26833	. GEAR, Spur	1
		(ATTACHING PARTS)	
-97	5100-37MF	. RING, Retaining	1
-98	18085	. WASHER, Flat	4
		---*---	
-99	27765	. PRINTED CIRCUIT ASSEMBLY	1
		(ATTACHING PARTS)	
-100	Comm	. SCREW, Assembled washer, 4-40 by 1/4 lg	1
-101	Comm	. SCREW, 4-40 by 5/16 lg	2
-102	14680	. WASHER, Spring tension	2
		---*---	
-103	26279	. . CONTACT	1
-104	26844	. . HUB ASSEMBLY	1
		(ATTACHING PARTS)	
-105	5100-37MF	. . RING, Retaining	1
-106	2670	. . WASHER, Flat	1
		---*---	
-107	26207-*	. . CRYSTAL, Quartz (to complete part number replace asterisk with frequency in MC)	18
-108	26991	. . PRINTED CIRCUIT BOARD SUBASSEMBLY	1
-109	26980	. SLEEVE	2
		(ATTACHING PARTS)	
-110	Comm	. SETSCREW, Fluted 3-48 by 3/32 lg	3
		---*---	

Figure & Index No.	Part No.	1 2 3 4 5 6 Description	Units per Assy
		RECEIVER-TRANSMITTER - Continued	
2-26-111	26979	. SHAFT	1
		(ATTACHING PARTS)	
-112	Comm	. SETSCREW, Fluted, 3-48 by 3/32 lg	10
		---*---	
-113	26279	. CONTACT	10
-113A	27741	. PRINTED CIRCUIT ASSEMBLY	1
		(ATTACHING PARTS)	
-114	Comm	. SCREW, 3-48 by 1/4 lg	2
-115	10353	. WASHER, Spring tension	2
		---*---	
-116	27737	. PRINTED CIRCUIT ASSEMBLY	3
		(ATTACHING PARTS)	
-117	Comm	. SCREW, 3-48 by 1/4 lg	6
-118	10353	. WASHER, Spring tension	6
		---*---	
-119	27733	. PRINTED CIRCUIT ASSEMBLY	1
		(ATTACHING PARTS)	
-120	Comm	. SCREW, 3-48 by 1/4 lg	2
-121	10353	. WASHER, Spring tension	2
		---*---	
-122	26730	. CAPACITOR ASSEMBLY, Gang	1
		(ATTACHING PARTS)	
-123	Comm	. SCREW, 3-48 by 3/16 lg	2
-124	Comm	. SCREW, 4-40 by 5/16 lg	3
-125	Comm	. SCREW, 4-40 by 3/8 lg	1
-126	14680	. WASHER, Spring tension	4
		---*---	
-127	28821	. SHIELD, Printed circuit	1
-127A	28715	. SHIELD, Printed circuit	1
-128	28825	. SHIELD	1
		(ATTACHING PARTS)	
-129	Comm	. SCREW, Assembled washer, 3-48 by 1/8 lg	2
		---*---	
-130	26683	. . GEAR ASSEMBLY	1
		(ATTACHING PARTS)	
-131	Comm	. . SETSCREW, Fluted, 3-48 by 3/32 lg	2
		---*---	
-132	115M1-T	. . SWITCH, Sensitive, SPDT, 5 amp 250 vac, 2 amp 30 vdc	1
-133	26769	. . ACTUATOR	1
		(ATTACHING PARTS)	
-134	Comm	. . SCREW, Assembled washer, 2-56 by 7/16 in.	2
		---*---	

NOTE: REFER TO SECTION I FOR PARTS BREAKDOWN OF PANEL SHOCKMOUNT.

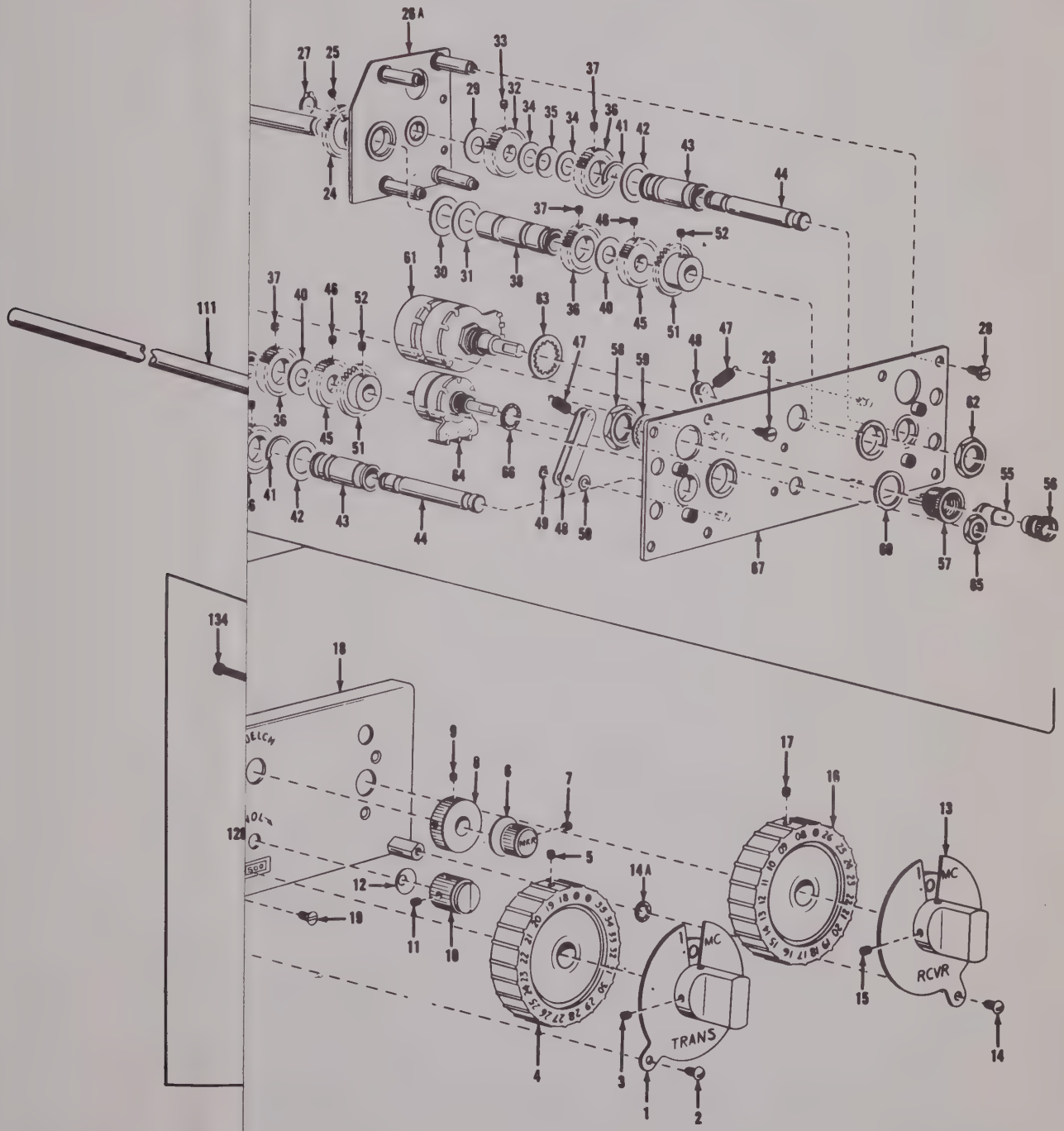


Figure 2-26. Receiver-Transmitter, Exploded View

NOTE: REFER TO SECTION I FOR PARTS BREAKDOWN OF PANEL SHOCKMOUNT.

NOTE: SOME PARTS OMITTED FOR CLARITY. REFER TO PARTS LIST FOR IDENTIFICATION OF ALL PARTS.

Figure 2-26. Receiver-Transmitter, Exploded View

SECTION 3

CESSNA NAV/OMNI 500

LIST OF REVISED PAGES ISSUED

INSERT LATEST REVISED PAGES. DESTROY SUPERSEDED PAGES.

CESSNA NAV/OMNI 500

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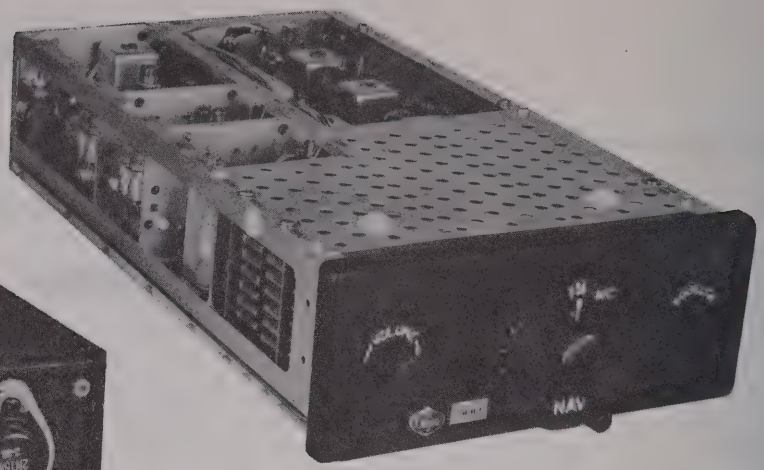
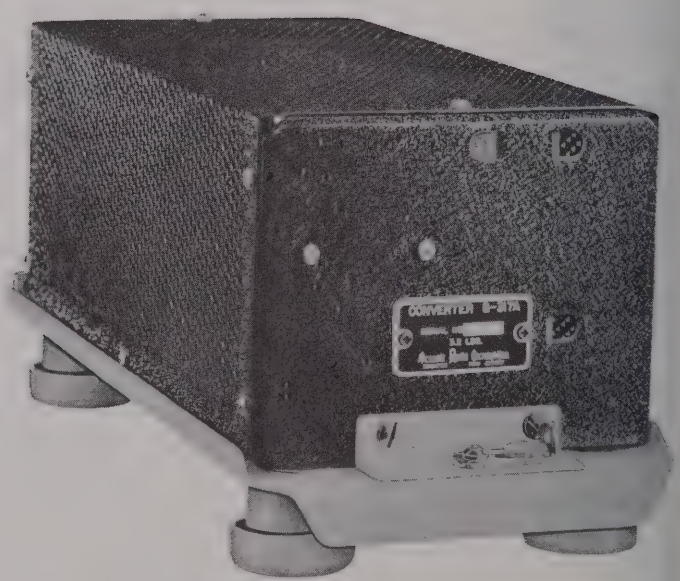


RECEIVER WITH MOUNTING

DYNAVERTER WITH MOUNTING

INDICATOR



CONVERTER WITH MOUNTING

Figure 3-1. Cessna NAV/OMNI 500 VHF Navigation Set, Major Units

CESSNA NAV/OMNI 500
General Information

INTRODUCTION.

This instruction book contains installation, operation, maintenance, and parts information for the Cessna NAV/OMNI 500, VHF Communication-Navigation Set.

PURPOSE.

The Cessna Nav/Omni 500 is a crystal-controlled, 380-channel, vhf communication-navigation receiver and a 20-channel glide slope receiver. The Nav/Omni 500 receives and interprets vhf omnidirectional range (VOR) and localizer signals between 108.00 and 117.95 mc, and glide slope signals between 329.3 and 335.0 mc. It also receives vhf communications signals between 118.00 and 126.95 mc.

SPECIFICATIONS.

Receiver.

General.

Mounting: 26780, 26790, 27591, or 27594

Weight: 4.4 pounds less mounting; 5.65 pounds with 26780; 6.15 pounds with 26790; 5.15 pounds with 27591; 5.65 pounds with 27594

Environmental Limits: Temperature: -40°C to +55°C
Altitude: 30,000 feet
Humidity: 95% at 50°C for 48 hours

Communication-Navigation Receiver Circuit.

Frequency Range: 108.00 to 126.95 mc

Number of Channels: 380

Channel Spacing: 50 kc

Input Impedance: 52 ohms (nominal)

Sensitivity: Less than 2.0 uv for 6 db S+N/N, 30% modulation, 1000 cps at audio output of 2 watts

Phone Output: 50 mw minimum into 300-ohm load

AGC: Less than 3 db from 10 to 100,000 uv

I-f Rejection: At least 90 db

Image Rejection: At least 65 db

Other Spurious Rejection: At least 60 db

Selectivity: 45 kc. 6 db down; 90 kc, 60 db down

Total Harmonic Distortion: Less than 15% with 20,000 uv, 1000 cps, 85% modulation

Audio Frequency Response: Within 4 db from 350 cps to 3000 cps

Squelch: Adjustable from 0 to 10 uv

Tube Complement:

5654	R-f Amplifier
5654	First Mixer
6922 (1/2)	Second Mixer
5749	2.0-mc I-f Amplifier
5750	Third Mixer
5749	First 455-kc I-f Amplifier
5749	Second 455-kc I-f Amplifier
5670	Megacycle Oscillator and Fractional Megacycle Oscillator
5814A	Audio Output and Navigation Cathode Follower
5751	First Audio Amplifier and Squelch Control

Diode Complement:

HD6226	Navigation Detector
HD6226	Automatic Noise Limiter
HD6226	AGC Clamp
HD6226	Audio Detector and AGC
HD6226	AGC Attack Diode

Glide Slope Receiver Circuit.

Frequency Range: 329.3-335.0 mc

Number of Channels: 20

Channel Selection: Automatic and simultaneous with selection of associated localizer channel

Input Impedance: 50 ohms (nominal)

Sensitivity: 40 uv or less of standard signal for 47 ua deflection

Spurious Rejection: Greater than 60 db

Tube Complement:

5899	R-f Amplifier
5899	First Mixer
6922	Glide Slope Channel Oscillator
6021	Doubler and Tripler Amplifiers
5749	I-f Amplifier
5670	Second Mixer and 28.3-megacycle Oscillator

Converter:

VOR Accuracy: ±0.3° maximum, with ±10% variation of supply voltage
±1° maximum, over temperature range of -40°C to +55°C
±1.5° typical, including course selector

LOC Accuracy: ±3° maximum, with ±10% variation of supply voltage
±4° maximum, over temperature range of -40°C to +55°C
±4° maximum, with variation in ground-station power frequency

Tube Complement:

5670	Reference Channel Amplifier
5670	Reference Channel Cathode Follower and Output Amplifier
5751	Reference Channel Amplifier
5670	Common Channel Amplifier
5670	Variable Channel Amplifier

Diode Complement:

HD6226, HD6226	Reference Channel Limiter
HD6226, HD6226	Discriminator
IN118, IN118	Flag/To-From Diodes
IN2069, IN2069	Course Indicator Phase Detector
HD6226	Localizer Flag Diode
IN118, IN118	Localizer Detector

Mounting: 24900

Weight: 3.2 pounds less mounting; 3.7 pounds including 24900

Dynaverter.

Input Power: 5.0 amperes at 13.75 volts dc (communication-navigation receiver circuit)
2.0 amperes at 13.75 volts dc (glide slope receiver circuit)
2.5 amperes at 27.5 volts dc (communication-navigation receiver circuit)
1.0 ampere at 27.5 volts dc (glide slope receiver circuit)

Tube Complement: 5749 I-f Amplifier
5749 I-f Amplifier
5749 I-f Amplifier
5670 90/150-cycle Amplifier

Transistor Complement: 28-volt Model: 2 ea. 2N1546 Multivibrator
14-volt Model: 2 ea. 2N1545 Multivibrator

Diode Complement:

HD6226	90/150-cycle Detector
HD6226	AGC Detector
HD6226	AGC Attack Diode
HD6226	Flag Diode
2 ea. IN118	Glide Slope Detector Diodes
IN2070	Blocking Diode
4 ea. IN2070	Bridge Rectifier
1N1826) 1N1823)	104V Voltage Regulator

Mounting: 24900

Weight: 3.2 pounds less mounting; 3.7 pounds including 24900

Indicator.

Weight: 1.5 pounds

DESCRIPTION OF UNITS.

Receiver. The receiver is panel-mounted containing the communication-navigation receiver circuit and parts of the glide slope receiver circuit. The communication-navigation circuit is a triple-conversion superheterodyne receiver. The panel unit contains the r-f and first i-f stages of a double-conversion superheterodyne glide slope receiver.

Except for the course selector, which is on the indicator, the receiver contains all the operation controls for the Nav/Omni 500. These controls include a combined primary power on-off switch and volume control, a squelch control, and two channel selector switches. The selected frequency is indicated on an illuminated dial. Electrical connections to the receiver are made at the rear of the unit through four cable assemblies.

Dynaverter. The dynaverter is a power converter, and includes the second i-f amplifiers, 90/150-cycle detector, and the metering circuit of the glide slope receiver circuit. The power converter transforms low-voltage dc to high-voltage dc for itself, the receiver, and the converter. The glide slope circuits provide information to the indicator. The dynaverter contains no operating controls. It is shock-mounted on a 24900 Mounting. All electrical connections to the unit are made at the rear of the unit through two cable assemblies.

Converter. The converter is fed the VOR and localizer signals from the receiver and converts these signals for visual presentation by the indicator. The converter has no operating controls. It is shock-mounted on an 24900 Mounting. All electrical connections to the converter are made at the rear of the unit through one cable assembly.

Indicator. The Indicator includes a course deviation meter, a glide slope (GS) flag mechanism, a course selector, and a FLAG/TO-FROM indicator. The course deviation meter uses a vertical pointer to show deviations from a selected VOR or localizer course and a horizontal pointer to show deviations from a glide slope. The operating or nonoperating condition of the pointers is indicated by the FLAG (OFF) position of the FLAG/TO-FROM indicator and the GS flag mechanism.

A VOR course is selected using the course selector. The course selected is indicated by a triangular-shaped pointer geared to the course selector. The reciprocal of the course selected is indicated by a circular-shaped pointer also geared to the course selector. Both pointers rotate around the perimeter of a course indicator dial, graduated in five-degree increments.

The TO-FROM portion of the FLAG/TO-FROM indicator provides the sense information required to resolve any ambiguity in the reading of the course indicator dial. The indicator will show TO when the indicator bearing is the magnetic bearing to the station, or FROM when the bearing is the magnetic bearing from the station.

Mountings. The 26780 Mounting or the 26790 Mounting is used to shock-mount one or two receivers, respectively. The mounting used also serves as a dust cover for the receiver. When shock-mounting is not required, 27591 or 27594 Mounting is used for mounting one or two receivers, respectively. The mounting fits into a panel cutout and is secured to the panel flanges with No. 6 screws. The receiver is secured by captive knurled nuts at the rear of the mounting.

Two 24900 Mountings are used for shock-mounting the dynaverter and the converter. Two studs at the rear of each unit engage the mounting. The units are locked in place by a snap-slide fastener on the front of the mounting.

Antenna. (Refer to Cessna Electronics Manual for applicable antennas.)

BASIC PRINCIPLES OF OPERATION.

General. The Nav/Omni 500 can receive all vhf omnirange (VOR) and localizer signals in the frequency range of 108.00 mc to 117.95 mc, and provide visual indication of deviation from a selected course on a panel-mounted meter. The equipment also receives all vhf communication transmissions in the frequency range of 108.00 to 126.95 mc. In addition, glide slope signals, in the frequency range of 329.3 mc to 335.0 mc, are received, and any deviation from the glide slope is visually displayed on the deviation meter of the indicator.

VOR Reception. A VOR station radiates a number of courses around its antenna system. The courses are called radials since they radiate from the five-element antenna system like spokes from the hub of a wheel. Each radial is formed by a signal transmitted by a VOR station. This signal consists of two independent components: the reference phase signal and the variable phase signal. The reference phase signal is radiated by a single dipole antenna to produce an omnidirectional field pattern around the entire antenna system, the phase of which does not vary with direction. The variable phase signal produces a rotating cardioid field pattern by using a goniometer rotated at a 30-rps rate to feed each pair of the remaining four antenna elements alternately. The phase of the variable signal, with respect to the reference signal, changes constantly at a 30-cps rate. The phase relationship of the reference and variable signals depends on the bearing of the aircraft from the north radial of the VOR transmitter. The phase relationship between the two signals is zero (signals in phase with each other) at all points on the magnetic north radial. On all other radials, they differ in phase according to the degree of angular displacement from magnetic north. When operating on VOR, the Nav/Omni 500 receives and amplifies the two signal components, detects the phase difference, and indicates the bearing from the transmitting station on the indicator.

Runway Localizer Reception. Runway localizers use 90- and 150-cps modulation signals. On the runway centerline these two modulations are equal in strength. On either side of the centerline one modulation signal is stronger than the other. When tuned to a runway localizer, the Nav/Omni 500 rectifies and compares the 90- and 150-cps signals and feeds a d-c current proportional to the difference in amplitude of these signals to the indicator. If the pilot is making his approach properly, the two equal signals cause a center reading on the indicator. If the aircraft is off course during a front-course approach, however, the stronger signal causes the indicator to read off-center by an amount determined by the deviation of the aircraft from the desired course. For example, if the pointer deflects to the right, the aircraft is to left of the proper path and a correction to the right must be made.

Glide Slope Reception. A glide-slope transmitter transmits a radio beam at an angle of approximately 2.5° above ground. The transmitter, operating in the frequency range of 329.3-335.0 mc, sends out patterns that are modulated at 90 and 150 cps. The area of equal signal strength between these patterns locates the glide slope. At points above the glide slope, the 90-cps modulation is predominant; at points below the glide slope, the 150-cps modulation is predominant. The Nav/Omni 500 detects the 90-cps and 150-cps modulations and actuates the horizontal pointer of the indicator. If the aircraft is above the glide slope, the pointer deflects upward.

VOR, Localizer, and VHF Communication Signal Reception. As shown in Figure 3-2, the signal picked up by the communication-navigation circuit in the receiver where the signal is amplified by r-f and i-f stages. The output of the final i-f amplifier is coupled to a navigation detector and an audio detector.

The output of the audio detector (communication signal) is applied to the communication-navigation receiver audio circuits where squelch control and agc are introduced and further amplification of the signal takes place. The plate load of the second audio amplifier is in the dynaverter. The audio output is coupled to a headset.

The navigation detector output (navigation signal) is routed through a cathode follower stage to the converter. In the converter (see figure 3-3) the signal is applied to the reference-channel and the variable-channel circuits. These circuits convert the signal into visual-track information for visual presentation by the indicator. With the receiver channel selector switch set to a localizer frequency, the navigation portion of the localizer signal is fed through the contacts of the energized VOR-localizer relay to the converter localizer circuits. These circuits convert the signal for presentation on the indicator. Flag information is fed from the localizer circuits and the VOR circuits to the flag circuits through the contacts of the VOR localizer relay.

Glide Slope Signal Reception. The glide slope signal, as shown in Figure 3-4, is picked up by the glide slope antenna and fed to the r-f and i-f stages of the glide slope receiver circuit in the receiver. The i-f output is fed to the dynaverter where the i-f signal is amplified, glide slope information is detected, and agc is introduced. The detected information is routed through an amplifier and a metering circuit to the horizontal pointer of the indicator which visually presents glide slope steering information. The metering circuit also feeds flag information to the indicator.

VOR AND ILS FREQUENCY ALLOCATIONS.

The FCC has allocated certain frequency bands for aeronautical navigation and communication facilities. Localizer and VOR facilities are located between 108.00 and 117.90 mc, communication facilities between 118.00 and 135.00 mc, and glide slope facilities between 328.6 and 335.4 mc.

Within the localizer-VOR band, specific frequencies are assigned to each facility as follows: All odd-tenth-megacycle frequencies, beginning with 108.1 mc and ending with 111.9 mc, are localizer frequencies. The remaining frequencies, from 112.1 to 117.9 mc, both odd and even tenths, are assigned to VOR facilities only.

The glide slope frequency band is divided into four frequency groups related to the 108-, 109-, 110-, and 111- mc localizer bands. In each group, five glide slope frequencies are paired with specific localizer frequencies as follows:

Localizer Frequency	Glide Slope Frequency
108.1	334.7
108.3	334.1
108.5	329.9
108.7	330.5
108.9	329.3
109.1	331.4
109.3	332.0
109.5	332.6
109.7	333.2
109.9	333.8
110.1	334.4
110.3	335.0
110.5	329.6
110.7	330.2
110.9	330.8
111.1	331.7
111.3	332.3
111.5	332.9
111.7	333.5
111.9	331.1

The receiver simultaneously and automatically selects the correct glide slope frequency when a localizer frequency is selected. When VOR frequencies or frequencies higher than 117.95 mc are selected, the glide slope receiver is disabled. Selection of 0.05-mc channels disables the navigation output of the communication-navigation receiver.

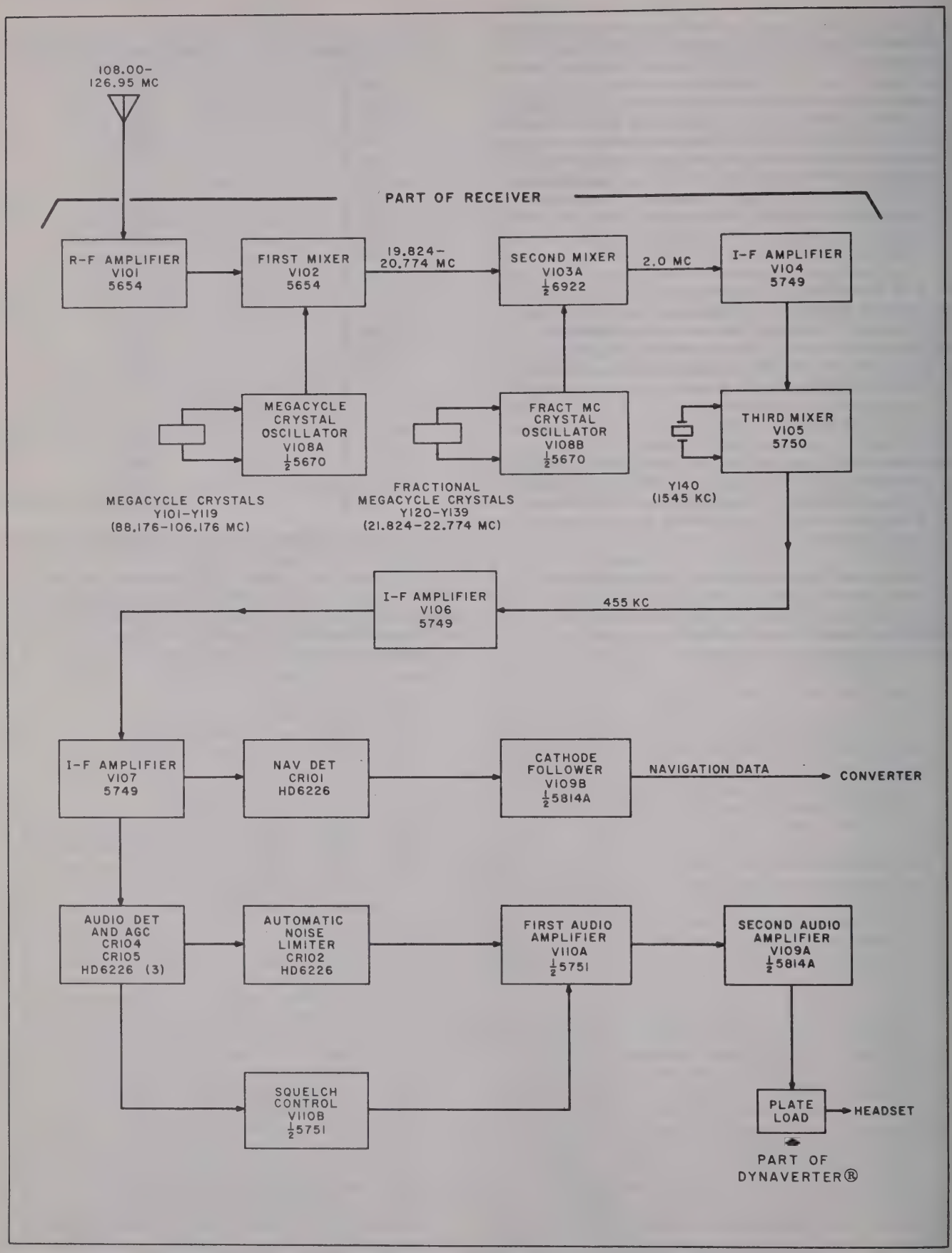


Figure 3-2. Communication-Navigation Receiving Circuit, Block Diagram

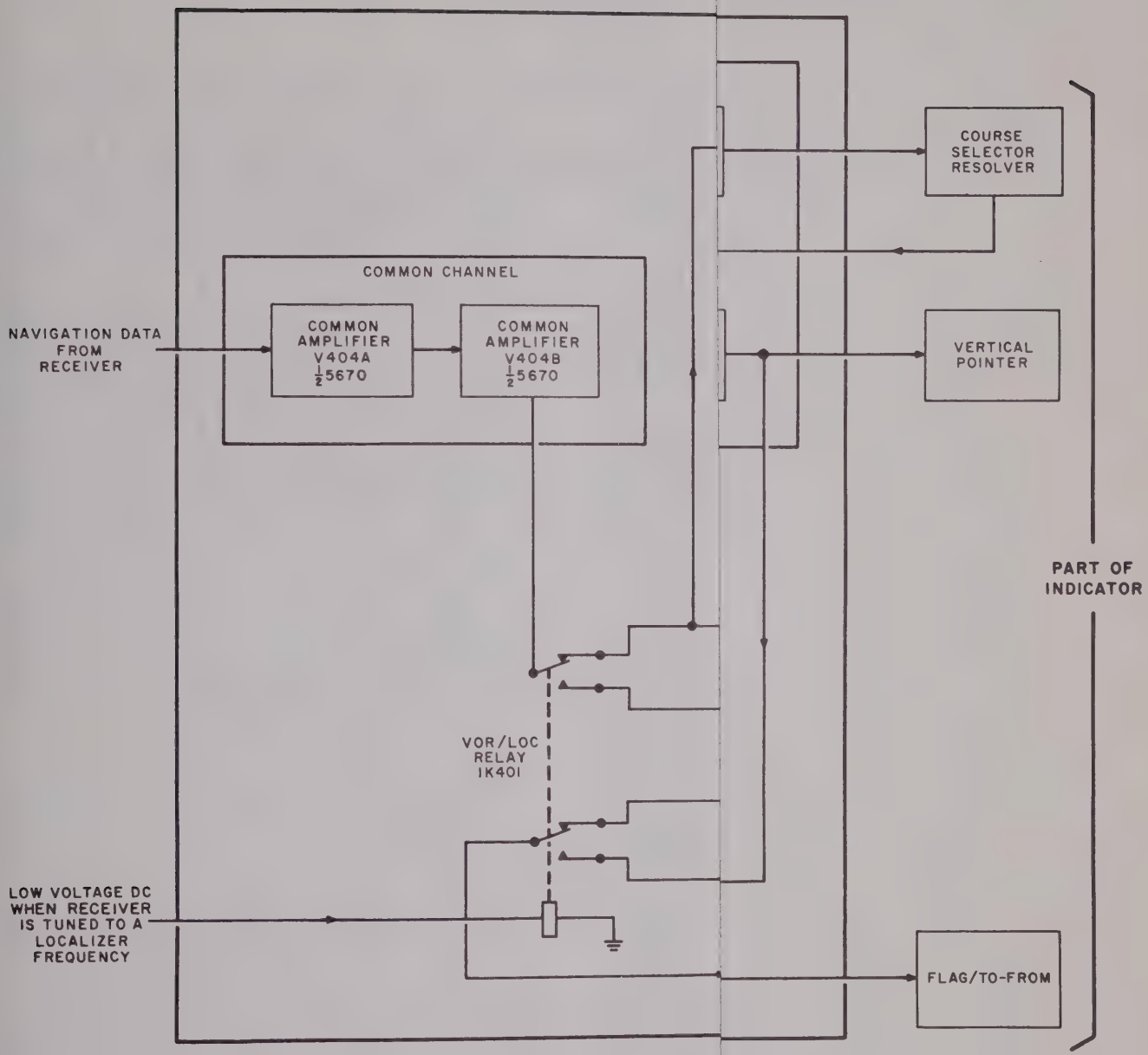


Figure 3-3. Converter, Block Diagram

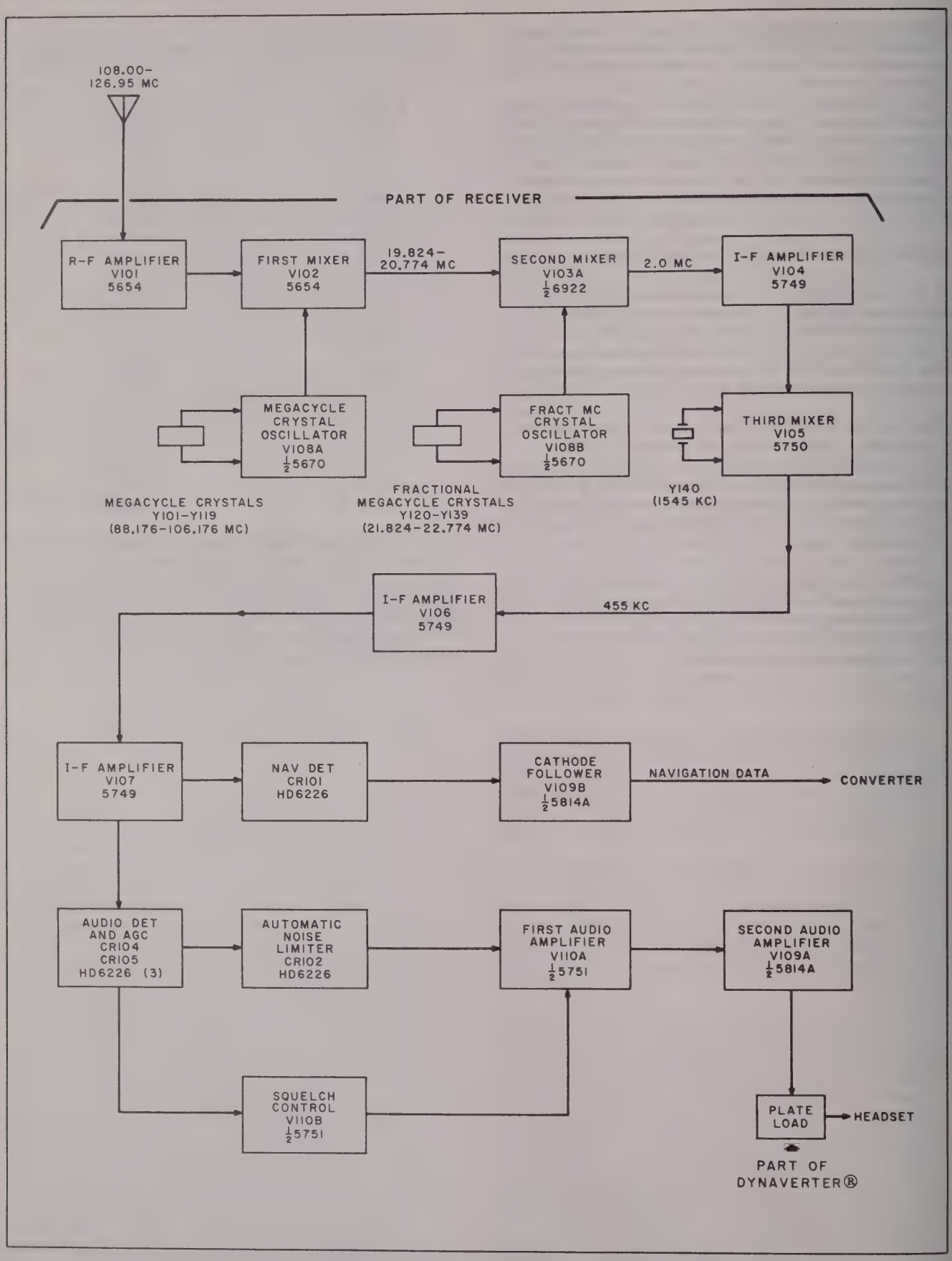
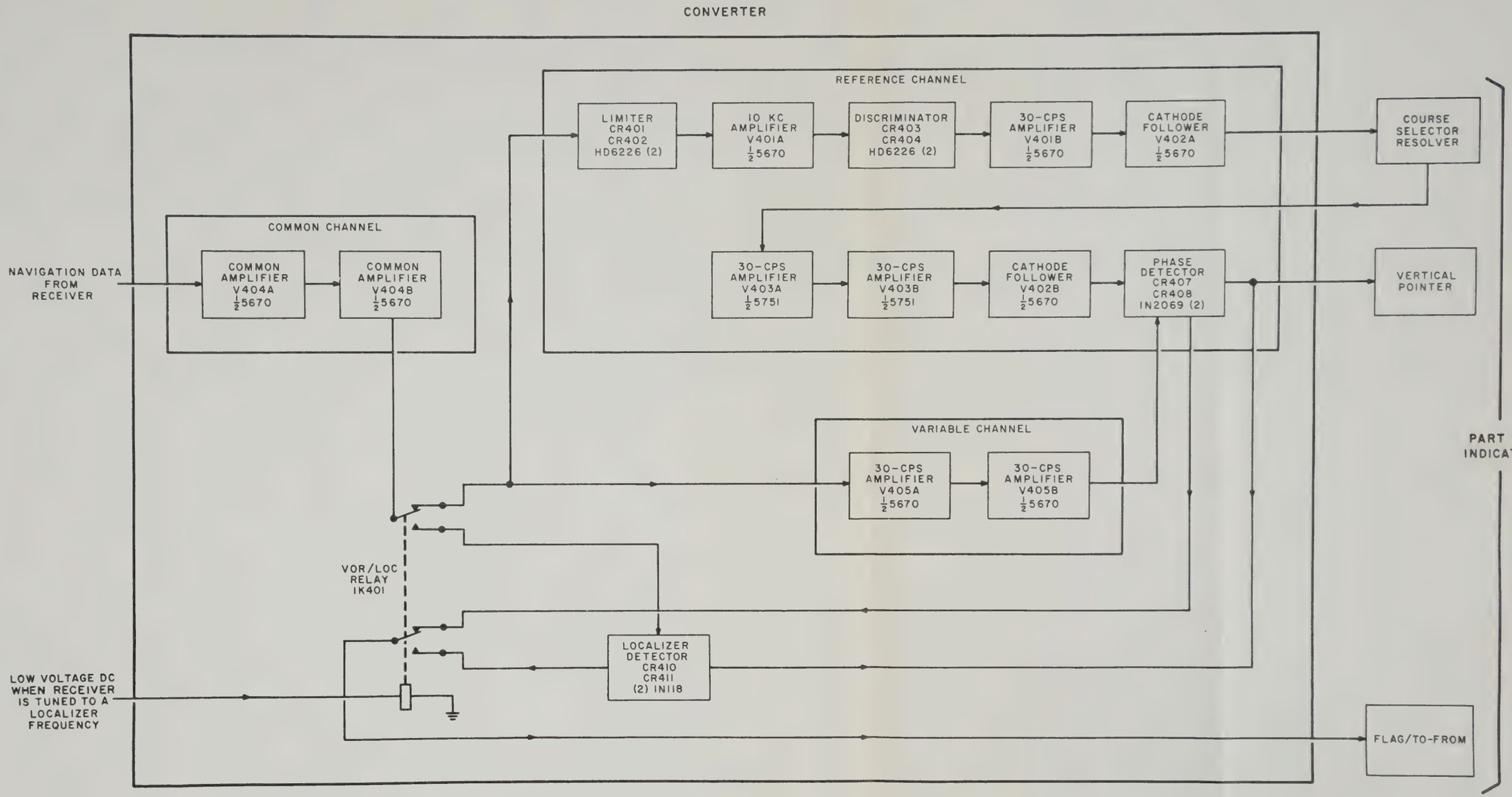


Figure 3-2. Communication-Navigation Receiving Circuit, Block Diagram



NOTE: RELAY SHOWN IN VOR POSITION.

Figure 3-3. Converter, Block Diagram

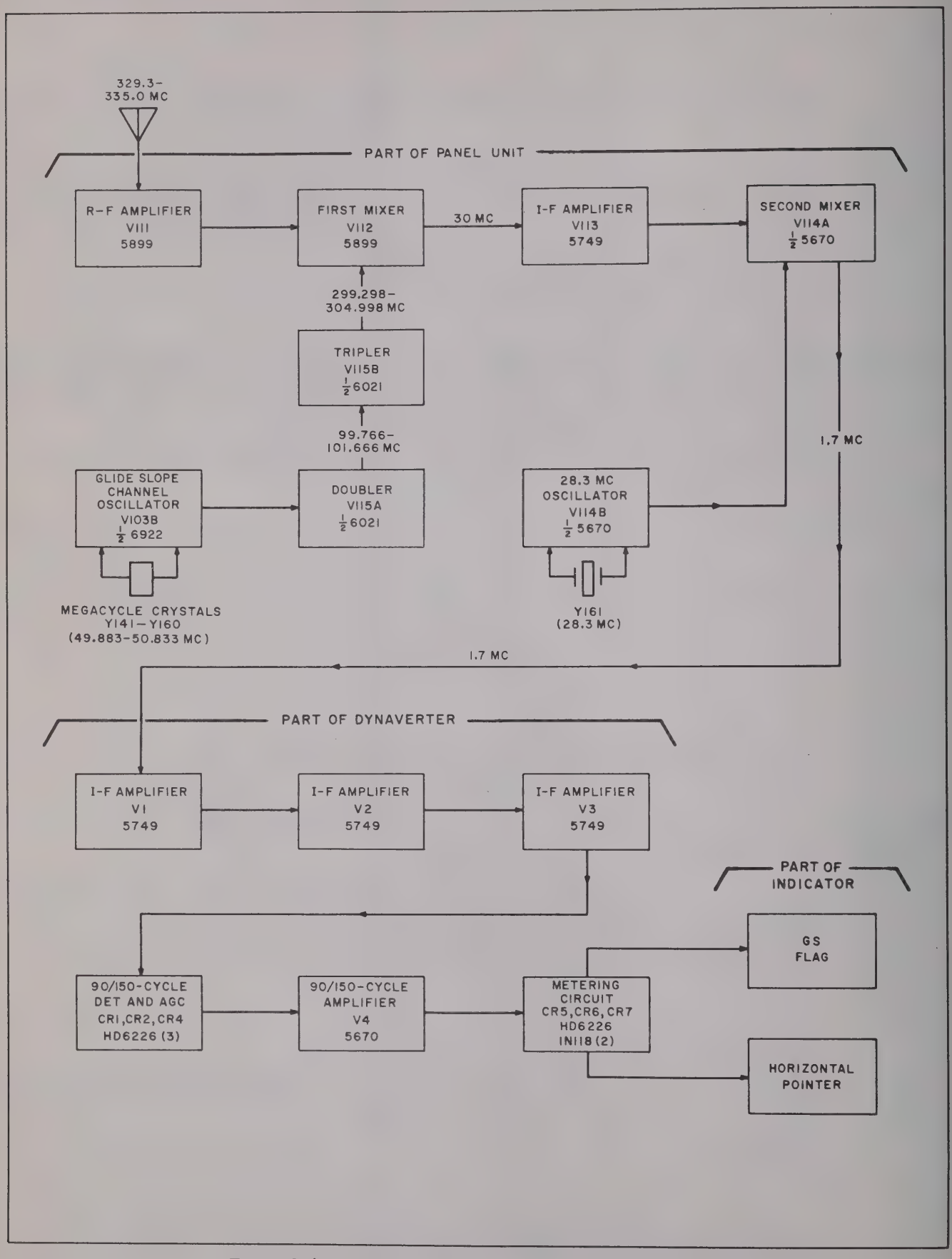


Figure 3-4. Glide Slope Receiving Circuit, Block Diagram

CESSNA NAV/OMNI 500

Installation

POST-INSTALLATION CHECKS.

General. The tuning of the Nav/Omni 500 is fully automatic and no tuning adjustments are required prior to placing the equipment into operation. However, an operational ground check of the unit should be performed with the aircraft engines running and all electrical equipment operating.

Post-installation checks require an ARC Type H-14A Signal Generator with a Boonton Radio Type 505-B Attenuator to provide simulated VOR and localizer signals and a Boonton Radio Model 232-A Glide Slope Signal Generator with an ARC Type A-13B Antenna to provide simulated glide slope signals. Equivalent test equipment may be substituted.

Operation of Nav/Omni 500. Complete operation instructions may be found in the Cessna Nav/Omni 500 Pilot's Manual.

Step 1. Connect the ATTEN output of the ARC Type H-14A Signal Generator through a Boonton Radio Type 505-B Attenuator to ANT connector J101 on the receiver. Set the OMNI TRACK switch to 0°, MODULATION switch to OMNI, MC switch to position B (114.9 mc), and ATTENUATOR dial to 100 uv.

Step 2. Turn the equipment on.

Step 3. Tune the receiver to 114.90 mc and set the indicator course selector to 0°. The vertical pointer should center and the FLAG/TO-FROM indicator should show TO.

Step 4. Set the indicator course selector to 180°. The vertical pointer should center, and the FLAG/TO-FROM indicator should show FROM.

Step 5. As the H-14A operator announces the ANGLE-TO tracks for each 60° around the compass, adjust the course selector accordingly. The vertical pointer should be centered, and the FLAG/TO-FROM indicator should show TO for each setting.

Step 6. Set the H-14A MC switch to position A (110.9 mc) and the MODULATION switch at AMP LOC Ⓓ (pointer center).

Step 7. Tune the receiver to 110.9 mc. The vertical pointer should center.

Glide Slope Circuit. Ground check the glide slope circuit of the receiver as follows:

Step 1. Choose an unobstructed area, preferably outdoors. Set up an ARC Type A-13B Antenna directly ahead of the aircraft, at least 10 feet from the glide-slope antenna of the aircraft and at least 6 feet above the ground. Direct the antenna toward the aircraft.

Step 2. Connect the RF OUTPUT connector of the Boonton Radio Model 232-A Glide Slope Signal Generator to the GP connector of the A-13B Antenna.

Step 3. Turn the equipment on.

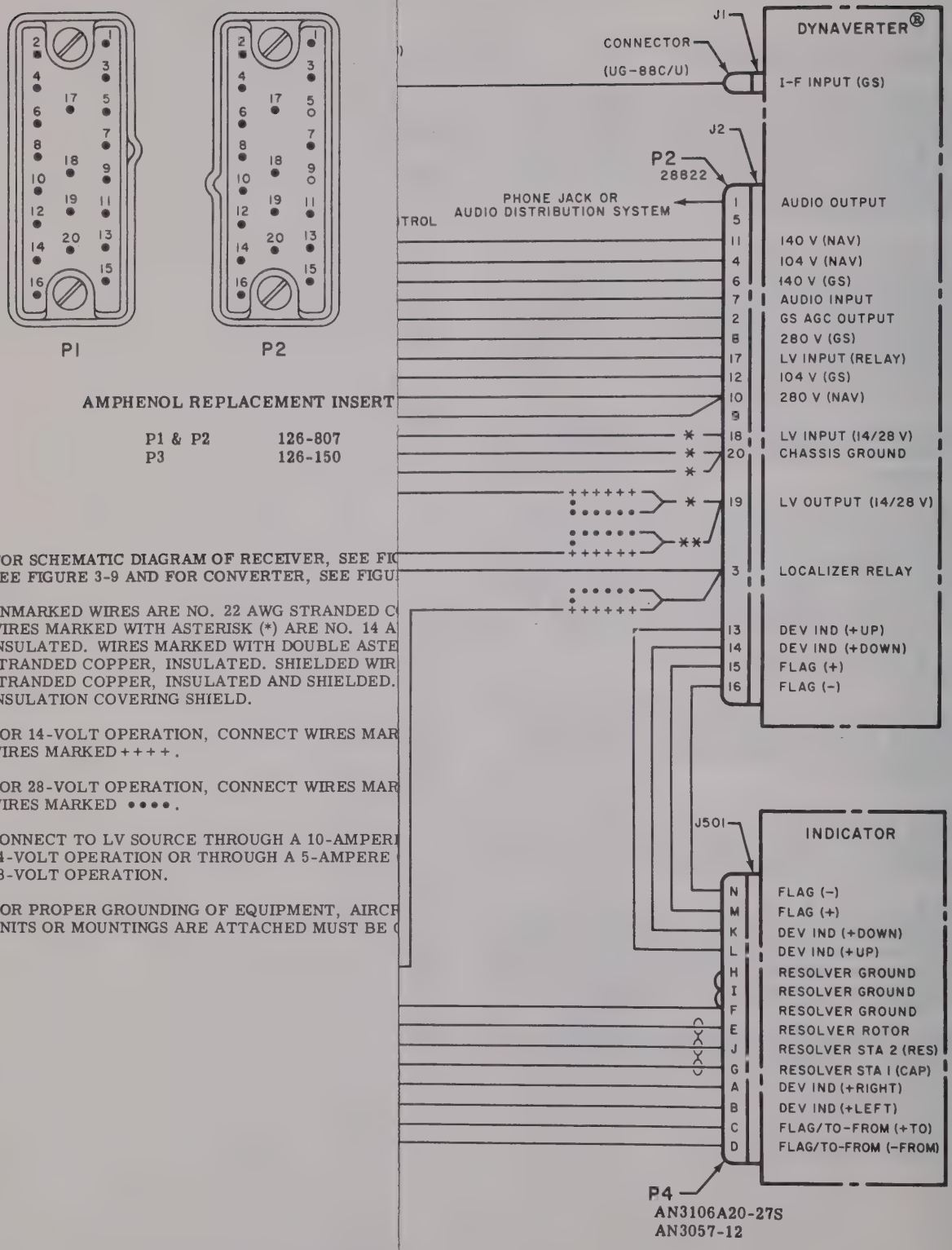
Step 4. Turn the OUTPUT LEVEL control of the signal generator to the maximum-output position.

Step 5. For each channel, adjust the signal generator for a standard, 700-uv on-course signal and check that the horizontal pointer of the indicator centers for an on-course signal and that the GS flag disappears.

Step 6. For each channel, adjust the signal generator for a standard, 700-uv, 2-db off-course signal (90-cps modulated signal predominant) and check that the horizontal pointer deflects downward slightly more than two dots and that the GS flag disappears.

Step 7. Use the signal generator DB TONE RATIO switch and check that the GS flag is in full view when either the 90-cps or the 150-cps modulation signal is removed.

Audio Circuits. Select several local channels between 118.0 and 126.95 mc. Adjust the VOLUME and SQUELCH controls for a desired audio output level and monitor each channel selected for satisfactory reception.



NOTES:

1. FOR SCHEMATIC DIAGRAM OF RECEIVER, SEE FI
SEE FIGURE 3-9 AND FOR CONVERTER, SEE FIGU

2. UNMARKED WIRES ARE NO. 22 AWG STRANDED C
WIRES MARKED WITH ASTERISK (*) ARE NO. 14 A
INSULATED. WIRES MARKED WITH DOUBLE ASTE
STRANDED COPPER, INSULATED. SHIELDED WIR
STRANDED COPPER, INSULATED AND SHIELDED.
INSULATION COVERING SHIELD.

3. FOR 14-VOLT OPERATION, CONNECT WIRES MAR
WIRES MARKED + + + + .

4. FOR 28-VOLT OPERATION, CONNECT WIRES MAR
WIRES MARKED • • • • .

5. CONNECT TO LV SOURCE THROUGH A 10-AMPERE
14-VOLT OPERATION OR THROUGH A 5-AMPERE
28-VOLT OPERATION.

6. FOR PROPER GROUNDING OF EQUIPMENT, AIRCR
UNITS OR MOUNTINGS ARE ATTACHED MUST BE

Figure 3-5. Cessna Omni 500 VHF Communica
Navigation Set, Interconnection Diagram

CESSNA NAV/OMNI 500

Maintenance

MAINTENANCE

This section contains typical voltage and resistance measurements. The measurements were made under the conditions noted. Also included in this section are schematic diagrams of the Nav/Omni 500.

VOLTAGE MEASUREMENTS

Conditions:

1. Adjust primary power source to 13.75 volts dc (for 14-volt units).

2. When measuring receiver and dynaverter voltages, set MC SEL and FRACT MC SEL switches to 109.3 mc. Measure converter voltages with MC SEL and FRACT MC SEL switches set to 114.90 mc.

3. Set SQUELCH control R154 to full clockwise position.

4. Set dynaverter i-f control R49 to full clockwise position.

5. Except for converter measurements, all measurements are made without r-f input.

6. To measure receiver terminal voltages, connect a signal generator (ARC Type H-14A or equivalent) through a Boonton Radio Type 505-B Attenuator (or equivalent), to the vhf antenna jack(J101). Calibrate the signal generator and set the H-14A, receiver and IN-319A for 114.90 mc with a selected course of zero degrees. Adjust the H-14A for an output of 100 uv.

7. All measurements are made with a vacuum tube voltmeter such as a Hewlett-Packard Model 410B.

8. All voltages are positive unless otherwise noted, and are measured with respect to chassis ground.

9. Voltages shown are for 14-volt units.

10. Terminals designated NC = no connection.

RESISTANCE MEASUREMENTS

Conditions:

1. All cables disconnected from NAV/OMNI 500.

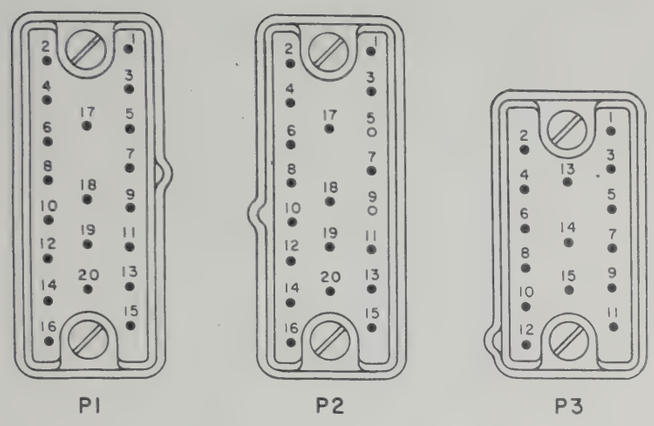
2. Controls front panel set as follows: SQUELCH full counterclockwise; VOLUME full clockwise.

3. All measurements made from pin indicated to chassis ground, unless otherwise noted. Common ohmmeter probe grounded.

4. All resistances are in ohms. Multipliers: K = 1000; M = 1, 000, 000.

TUBE TERMINAL VOLTAGES

Test Point		VTVM		Test Point		VTVM	
Tube	Pin No.	Scale	Voltage	Tube	Pin No.	Scale	Voltage
RECEIVER							
V101 R-f Amplifier (5654)	1	1	0.5	V102 First Mixer (5654)	1	1	0.5
	2	3	1.5		2	10	3.3
	3	10	6.3		3	10	6.3
	4	30	12.6		4	30	12.6
	5	300	200.		5	300	100.
	6	100	88.		6	100	90.
	7	3	1.5		7	10	3.3



AMPHENOL REPLACEMENT INSERT NUMBERS

P1 & P2	126-807
P3	126-150

NOTES:

1. FOR SCHEMATIC DIAGRAM OF RECEIVER, SEE FIGURE 3-7 FOR DYNAVERTER, SEE FIGURE 3-9 AND FOR CONVERTER, SEE FIGURE 3-8.
2. UNMARKED WIRES ARE NO. 22 AWG STRANDED COPPER, INSULATED. WIRES MARKED WITH ASTERISK (*) ARE NO. 14 AWG STRANDED COPPER, INSULATED. WIRES MARKED WITH DOUBLE ASTERISK (**) ARE NO. 16 AWG STRANDED COPPER, INSULATED. SHIELDED WIRES ARE NO. 22 AWG STRANDED COPPER, INSULATED AND SHIELDED. SHIELDED WIRES HAVE INSULATION COVERING SHIELD.
3. FOR 14-VOLT OPERATION, CONNECT WIRES MARKED •••• AND OMIT WIRES MARKED ++++.
4. FOR 28-VOLT OPERATION, CONNECT WIRES MARKED ++++ AND OMIT WIRES MARKED ••••.
5. CONNECT TO LV SOURCE THROUGH A 10-AMPERE CIRCUIT BREAKER FOR 14-VOLT OPERATION OR THROUGH A 5-AMPERE CIRCUIT BREAKER FOR 28-VOLT OPERATION.
6. FOR PROPER GROUNDING OF EQUIPMENT, AIRCRAFT SURFACE TO WHICH UNITS OR MOUNTINGS ARE ATTACHED MUST BE CLEAN, BARE METAL.

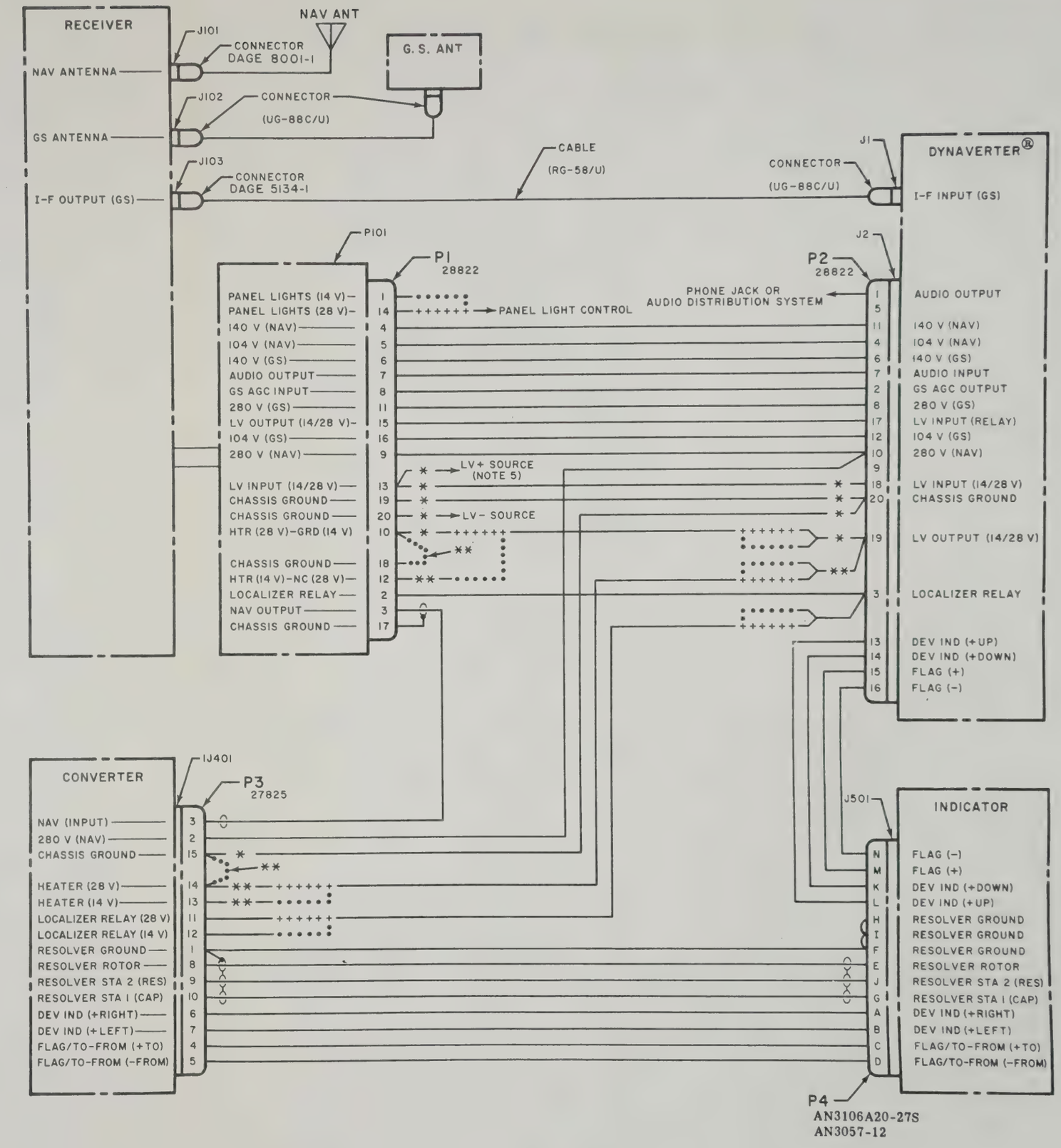


Figure 3-5. Cessna Omni 500 VHF Communication-Navigation Set, Interconnection Diagram

CESSNA NAV/OMNI 500

Maintenance

MAINTENANCE

This section contains typical voltage and resistance measurements. The measurements were made under the conditions noted. Also included in this section are schematic diagrams of the Nav/Omni 500.

VOLTAGE MEASUREMENTS

Conditions:

1. Adjust primary power source to 13.75 volts dc (for 14-volt units).

2. When measuring receiver and dynaverter voltages, set MC SEL and FRACT MC SEL switches to 109.3 mc. Measure converter voltages with MC SEL and FRACT MC SEL switches set to 114.90 mc.

3. Set SQUELCH control R154 to full clockwise position.

4. Set dynaverter i-f control R49 to full clockwise position.

5. Except for converter measurements, all measurements are made without r-f input.

6. To measure receiver terminal voltages, connect a signal generator (ARC Type H-14A or equivalent) through a Boonton Radio Type 505-B Attenuator (or equivalent), to the vhf antenna jack(J101). Calibrate the signal generator and set the H-14A, receiver and IN-319A for 114.90 mc with a selected course of zero degrees. Adjust the H-14A for an output of 100 uv.

7. All measurements are made with a vacuum tube voltmeter such as a Hewlett-Packard Model 410B.

8. All voltages are positive unless otherwise noted, and are measured with respect to chassis ground.

9. Voltages shown are for 14-volt units.

10. Terminals designated NC = no connection.

RESISTANCE MEASUREMENTS

Conditions:

1. All cables disconnected from NAV/OMNI 500.

2. Controls front panel set as follows: SQUELCH full counterclockwise; VOLUME full clockwise.

3. All measurements made from pin indicated to chassis ground, unless otherwise noted. Common ohmmeter probe grounded.

4. All resistances are in ohms. Multipliers: K = 1000; M = 1,000,000.

TUBE TERMINAL VOLTAGES

RECEIVER

Test Point		VTVM		Test Point		VTVM	
Tube	Pin No.	Scale	Voltage	Tube	Pin No.	Scale	Voltage
V101 R-f Amplifier (5654)	1	1	0.5	V102 First Mixer (5654)	1	1	0.5
	2	3	1.5		2	10	3.3
	3	10	6.3		3	10	6.3
	4	30	12.6		4	30	12.6
	5	300	200.		5	300	100.
	6	100	88.		6	100	90.
	7	3	1.5		7	10	3.3

VOLTAGE MEASUREMENTS - Continued

TUBE TERMINAL VOLTAGES - Continued

RECEIVER - CONTINUED

Test Point		VTVM	
Tube	Pin No.	Scale	Voltage
V103 Second Mixer and Glide Slope Channel Oscillator† (6922)	1	300	220.
	2	1	0.
	3	10	7.2
	4	30	12.6
	5	10	6.3
	6	300	140.
	7	1	0.
	8	100	38.8
	9	1	0.
V104 I-f Amplifier (5749)	1	1	0.5
	2	1	0.
	3	10	6.3
	4	30	12.6
	5	100	95.
	6	100	95.
	7	10	4.2
V105 Third Mixer (5750)	1	10	-4.2
	2	3	2.5
	3	30	12.6
	4	10	6.3
	5	300	270.
	6	100	48.
	7	1	0.
V106 I-f Amplifier (5749)	1	1	0.5
	2	1	0.
	3	10	6.3
	4	1	0.
	5	100	93.
	6	100	93.
	7	10	2.9
V107 I-f Amplifier (5749)	1	1	0.
	2	1	0.
	3	10	6.3
	4	1	0.
	5	300	276.
	6	300	104.
	7	10	3.3
V108 Megacycle and Fractional Megacycle Oscillators (5670)	1	10	6.3
	2	1	0.
	3	1	-0.8
	4	100	80.
	5	1	0.
	6	300	130.
	7	10	-3.7
	8	1	0.
	9	30	12.6

Test Point		VTVM	
Tube	Pin No.	Scale	Voltage
V109 Audio Output Amplifier and Navigation Cathode Follower (5814)	1	300	270.
	2	1	0.
	3	30	11.
	4	30	12.6
	5	1	0.15
	6	300	280.
	7	30	13.
	8	30	29.
	9	10	6.3
V110 First Audio Amplifier and Squelch Control (5751)	1	300	170.
	2	300	104.
	3	300	106.
	4	1	0.
	5	1	0.
	6	300	103.
	7	10	5.4
	8	30	15.
	9	10	6.3
V111 R-f Amplifier† (5899)	1	1	-0.08
	2	3	2.0
	3	30	14.
	4	3	2.
	5	300	115.
	6	10	7.
	7	100	96.
	8	3	2.
V112 First Mixer† (5899)	1	3	-1.3
	2	1	0.7
	3	30	14.
	4	1	0.7
	5	300	145.
	6	10	7.
	7	100	44.
	8	1	0.7
V113 I-f Amplifier† (5749)	1	1	0.
	2	NC	NC
	3	30	14.
	4	30	23.
	5	300	280.
	6	100	94.
	7	3	2.2
V114 Second Mixer† and 28.3-mc Oscillator (5670)	1	30	23.
	2	3	2.1
	3	1	0.
	4	100	96.
	5	NC	NC
	6	300	140.
	7	1	0.
	8	3	1.4
	9	30	27.

VOLTAGE MEASUREMENTS - Continued

TUBE TERMINAL VOLTAGES - Continued

Test Point		VTVM	
Tube	Pin No.	Scale	Voltage
RECEIVER - Continued			
V115 Doubler and Tripler Amplifiers† (6021)	1	100	90.
	2	10	-9.4
	3	10	6.6
	4	10	3.2
	5	10	5.2
	6	1	0.
	7	1	0.
	8	100	94.
CONVERTER			
V401 10-kc and 30-cps Amplifiers (5670)	1	10	7.4
	2	10	3.4
	3	3	-1.2
	4	300	170.
	5	1	0.42*
	6	300	165.
	7	10	3.2
	8	10	6.4
	9	3	1.
V402 Cathode Follower (5670)	1	30	13.5
	2	30	16.
	3	30	25.5
	4	300	225.
	5	1	0.14*
	6	300	120.
	7	30	17.
	8	30	18.5
	9	10	7.4
V403 Reference Channel 30-cps Amplifier (5751)	1	300	220.
	2	3	2.6*
	3	3	2.7
	4	30	13.5
	5	3	1.1
	6	300	200.
	7	1	0.1*
	8	30	2.3
	9	10	7.4
V404 Common Amplifier (5670)	1	3	1.
	2	10	3.6
	3	1	0.8*
	4	300	160.
	5	3	1.2*
	6	300	190.
	7	100	56.
	8	100	62.
	9	10	7.2

Test Point		VTVM	
Tube	Pin No.	Scale	Voltage
CONVERTER			
V405 Variable Channel 30-cps Amplifier (5670)	1	10	7.2
	2	10	5.
	3	3	1.7*
	4	300	175.
	5	1	0.28*
	6	300	140.
	7	10	8.
	8	30	10.
	9	30	13.5
DYNAVERTER			
V1 I-f Amplifier† (5749)	1	1	0.3
	2	1	0.
	3	10	6.8
	4	1	0.
	5	300	285.
	6	300	97.
	7	3	1.1
V2 I-f Amplifier† (5749)	1	1	0.26
	2	1	0.
	3	10	6.8
	4	100	44.
	5	300	285.
	6	100	91.
	7	3	1.1
V3 I-f Amplifier† (5749)	1	1	0.
	2	1	0.
	3	30	14.
	4	30	21.
	5	300	285.
	6	100	94.
	7	3	2.1
V4 90/150 Amplifier† (5670)	1	30	28.
	2	3	1.6
	3	1	0.
	4	300	135.
	5	1	0.
	6	1	0.★
	7	1	0.★
	8	3	1.3★
	9	30	21.

† Part of glide slope receiver circuit.
* Voltages shown are a-c voltages.
★ Terminal used for wiring of unit. Tube elements affected do not function.

VOLTAGE MEASUREMENTS - Continued

CONNECTOR TERMINAL VOLTAGES

Test Point		VTVM		Test Point		VTVM	
Connector	Pin No.	Scale	Voltage	Connector	Pin No.	Scale	Voltage
RECEIVER							
P101	1	1	0.	P101 (Cont.)	11	300	280.
	2	30	27.		12	30	14.
	3	30	18.		13	100	28.
	4	300	145.		14	1	0.
	5	300	100.		15	100	28.
	6	300	145.		16	100	95.
	7	300	280.		17	1	0.
	8	1	0.3		18	1	0.
	9	300	280.		19	1	0.
	10	30	28.		20	1	0.
CONVERTER							
1J401	1	1	0.	1J401 (Cont.)	8	3	1.2
	2	300	280.		9	1	0.
	3	10	3.2†		10	1	0.2†
	4	10	8.2		11	1	0.
	5	10	8.		12	1	0.
	6	10	8.		13	30	13.5
	7	10	8.		14	1	0.
					15	1	0.
DYNAVERTER							
J2	1	1	0.	J2 (Cont.)	11	1000	300.
	2	30	28.		12	1	0.28
	3	1	0.		13	30	28.
	4	300	150.		14	1	0.
	5	300	100.		15	30	28.
	6	300	150.		16	300	100.
	7	1000	300.		17	1	0.
	8	1	0.		18	1	0.
	9	1000	300.		19	3	1.1
	10	30	28.		20	3	1.1

† Voltages shown are a-c voltages.

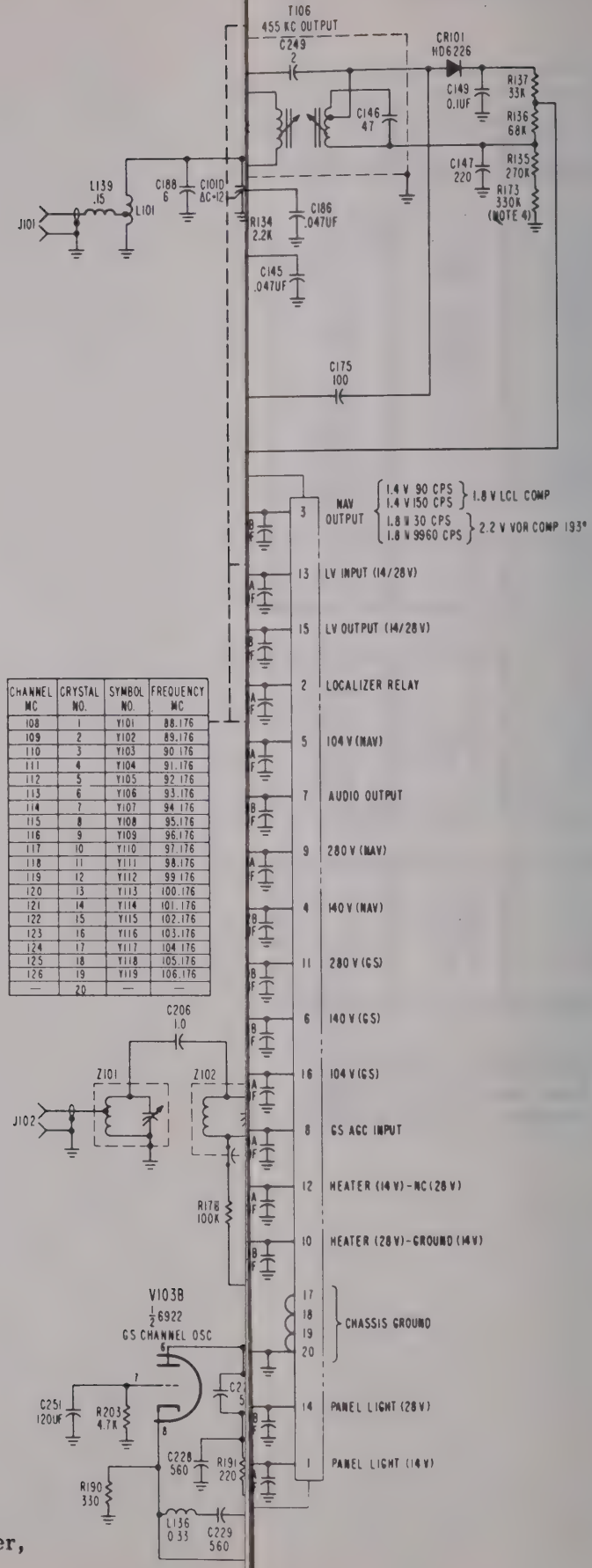
RESISTANCE MEASUREMENTS

Tube	Pin No.								
	1	2	3	4	5	6	7	8	9
RECEIVER									
V101†	700K	180	0	3.4	∞	100K	180	-	-
V102†	600K	1.2K	3.5	4	100K	120K	1.2K	-	-
V103	∞	0	2.2K	2.2	0	∞	4.7K	160	0
V104†	330K	0	2.4	2.2	100K	100K	820	-	-
V105†	12K	680	2	2	∞	∞	3.8	-	-
V106†	330K	0	2	0	95K	95K	270	-	-
V107†	20	0	4	4	∞	75K	390	-	-
V108	4.2	0.4	20K	100K	0	∞	100K	0.5	2
V109	∞	390K	1.5K	2	2	∞	700K	22K	3.8
V110	∞	700K	95K	4	4	500	650K	6.8K	4.2
V111*	∞	330	2	330	∞	2.6	∞	330	-
V112*	∞	470	1.9	470	∞	2.4	∞	470	-
V113†	∞	NC	1.8	4	∞	∞	220	-	-
V114	4	330	0	∞	NC	∞	68	330	4
V115*	∞	10K	2.4	220	160	0	4.7K	∞	-
CONVERTER									
V401	3	1.8K	5M	140K	∞	140K	46K	1.5K	1.8
V402	3	3.4K	900K	150K	∞	150K	1M	3.8K	3
V403	100K	1M	4K	3	1.8	300K	500K	2.8K	4.5
V404	1.8	1.8K	1M	200K	∞	150K	1M	10K	3
V405	3	2.6K	300K	100K	∞	150K	1M	2K	3
DYNAVERTER									
V1†	700K	0	2.8	0	700K	1.2M	70	-	-
V2†	700K	0	2.8	4.2	700K	1.2M	75	-	-
V3†	4.2	0	4	4.2	700K	1.2M	220	-	-
V4	2.4	150	130K	8.5K	0	∞★	500K★	∞★	4

† Tube base contains 7 pins.
* Tube base contains 8 pins.
★ Terminal used for wiring of unit. Tube elements affected do not function.

NOTES:

1. RESISTOR VALUES ARE IN OHMS. MULTIPLIERS: K = 1000, M = 1,000,000.
2. CAPACITOR VALUES ARE IN MICROMICROFARADS ($\mu\mu$F), UNLESS OTHERWISE NOTED.
3. INDUCTOR VALUES ARE IN MICROHENRIES (μH), UNLESS OTHERWISE NOTED.
4. VALUES OF R157, R172, AND R173 ARE SELECTED AND INSTALLED DURING FINAL ADJUSTMENT. VALUES NOTED ARE APPROXIMATE.



CHANNEL MC	CRYSTAL NO.	SYMBOL NO.	FREQUENCY MC
108	1	Y101	88.176
109	2	Y102	89.176
110	3	Y103	90.176
111	4	Y104	91.176
112	5	Y105	92.176
113	6	Y106	93.176
114	7	Y107	94.176
115	8	Y108	95.176
116	9	Y109	96.176
117	10	Y110	97.176
118	11	Y111	98.176
119	12	Y112	99.176
120	13	Y113	100.176
121	14	Y114	101.176
122	15	Y115	102.176
123	16	Y116	103.176
124	17	Y117	104.176
125	18	Y118	105.176
126	19	Y119	106.176
—	20	—	—

Figure 3-6. Cessna Nav/Omni 500 Receiver, Schematic Diagram

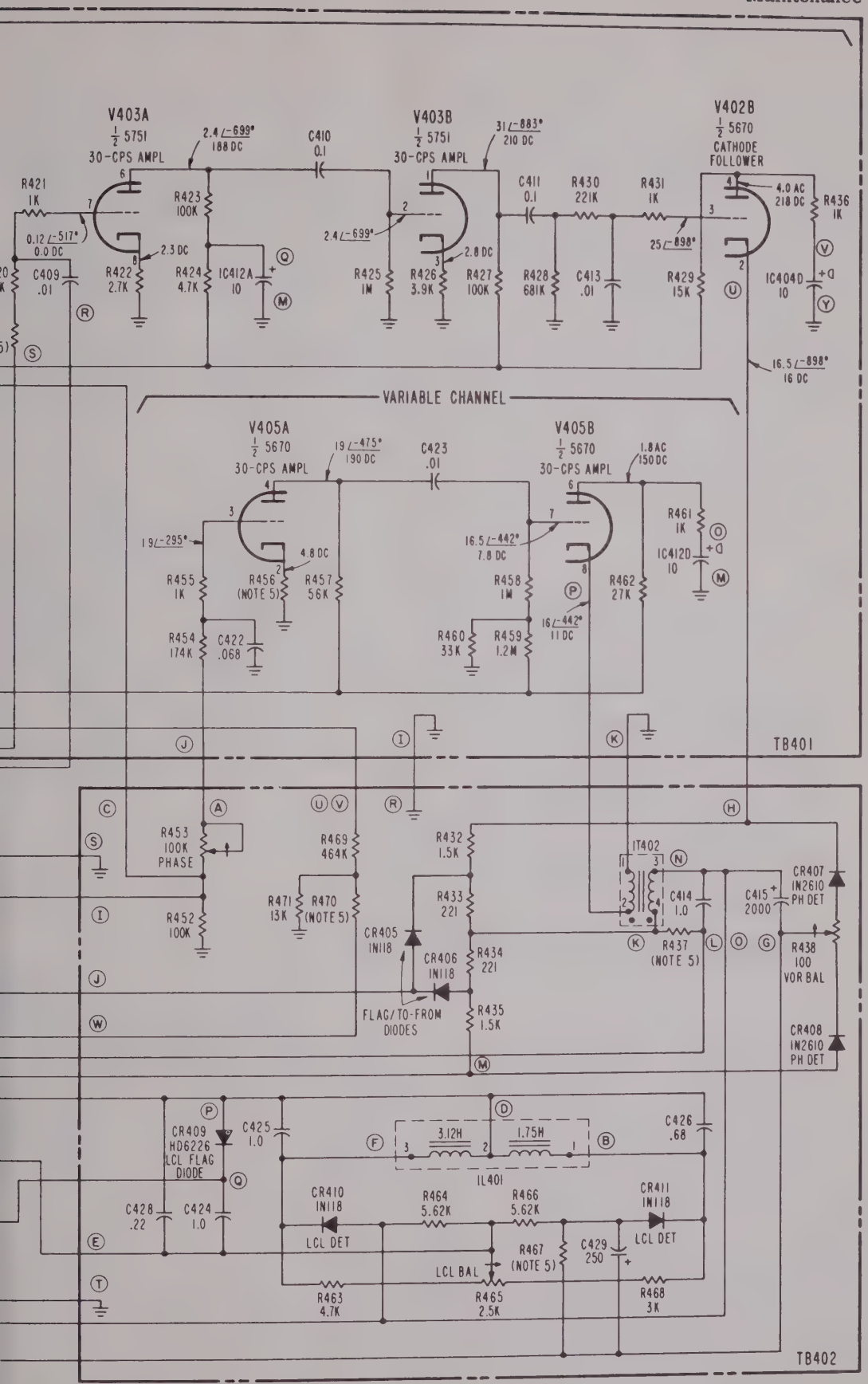
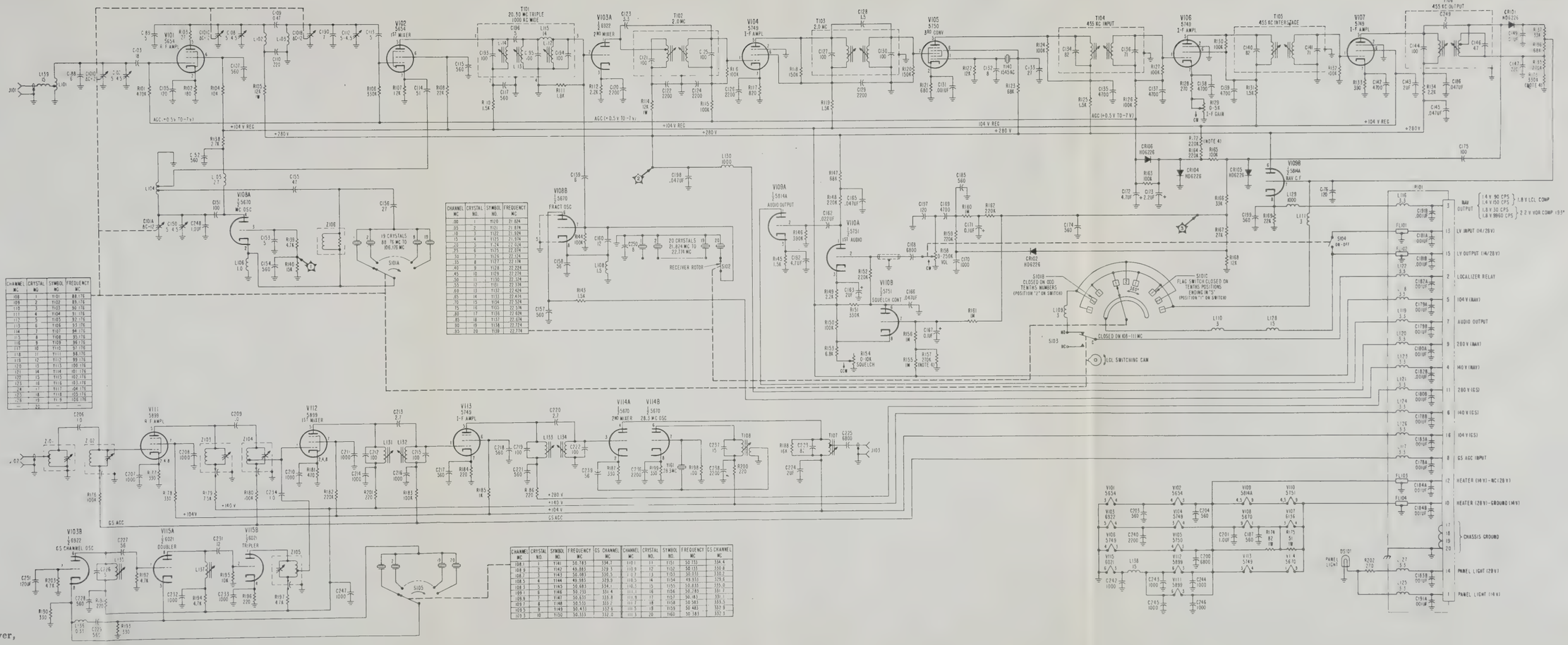


Figure 3-7. Converter, Schematic Diagram

NOTES:

1. RESISTOR VALUES ARE IN OHMS. MULTIPLIERS: K = 1000, M = 1,000,000.
2. CAPACITOR VALUES ARE IN MICROMICROFARADS (μμF), UNLESS OTHERWISE NOTED.
3. INDUCTOR VALUES ARE IN MICROHENRIES (μH), UNLESS OTHERWISE NOTED.
4. VALUES OF R157, R172, AND R173 ARE SELECTED AND INSTALLED DURING FINAL ADJUSTMENT. VALUES NOTED ARE APPROXIMATE.



CHANNEL NO.	CRYSTAL NO.	SYMBOL NO.	FREQUENCY MC
108	1	Y101	88.175
109	2	Y102	89.175
110	3	Y103	90.175
111	4	Y104	91.175
112	5	Y105	92.175
113	6	Y106	93.175
114	7	Y107	94.175
115	8	Y108	95.175
116	9	Y109	96.175
117	10	Y110	97.175
118	11	Y111	98.175
119	12	Y112	99.175
120	13	Y113	100.176
121	14	Y114	101.176
122	15	Y115	102.176
123	16	Y116	103.176
124	17	Y117	104.176
125	18	Y118	105.176
126	19	Y119	106.176
—	20	—	—

CHANNEL NO.	CRYSTAL NO.	SYMBOL NO.	FREQUENCY MC
00	1	Y120	21.824
05	2	Y121	21.874
10	3	Y122	21.924
15	4	Y123	21.974
20	5	Y124	22.024
25	6	Y125	22.074
30	7	Y126	22.124
35	8	Y127	22.174
40	9	Y128	22.224
45	10	Y129	22.274
50	11	Y130	22.324
55	12	Y131	22.374
60	13	Y132	22.424
65	14	Y133	22.474
70	15	Y134	22.524
75	16	Y135	22.574
80	17	Y136	22.624
85	18	Y137	22.674
90	19	Y138	22.724
95	20	Y139	22.774

CHANNEL NO.	CRYSTAL NO.	SYMBOL NO.	FREQUENCY MC	GS CHANNEL NO.
108 T	1	Y141	50.783	334.7
108 B	2	Y142	49.883	329.3
108.5	3	Y143	50.083	330.5
108.5	4	Y144	49.383	326.9
109 T	5	Y145	50.683	334.1
109 T	6	Y146	50.233	331.4
109 B	7	Y147	50.033	330.8
109 T	8	Y148	50.533	333.2
109.5	9	Y149	50.433	332.6
109.5	10	Y150	50.533	332.0

CHANNEL NO.	CRYSTAL NO.	SYMBOL NO.	FREQUENCY MC	GS CHANNEL NO.
110 T	11	Y151	50.733	334.4
110 B	12	Y152	50.133	330.8
110 T	13	Y153	50.033	330.2
110.5	14	Y154	49.933	329.6
110.5	15	Y155	50.033	330.2
111 T	16	Y156	50.783	334.7
111 B	17	Y157	50.483	332.7
111 T	18	Y158	50.583	333.3
111 B	19	Y159	50.483	332.7
111 B	20	Y160	50.383	332.1

Figure 3-6. Cessna Nav/Omni 500 Receiver, Schematic Diagram

NOTES:

1. RESISTOR VALUES ARE IN OHMS. MULTIPLIERS: K = 1000, M = 1,000,000.
2. CAPACITOR VALUES ARE IN MICROFARADS (μF), UNLESS OTHERWISE NOTED.
3. INDUCTOR VALUES ARE IN HENRIES (H).
4. RELAY 1K401 IS SHOWN UNENERGIZED.
5. VALUES OF COMPONENTS LISTED ARE SELECTED AND INSTALLED DURING FINAL ADJUSTMENT.

REFERENCE DESIGNATION	LIMITING VALUE (OHMS)	PURPOSE
R419	0 - 30K	MINIMIZE QUADRANTAL ERROR
R437	470 - 820	ADJUST VOR FLAG CURRENT
R456	1.5K - 4.7K	ADJUST VOR SENSITIVITY
R467	1.8K - 6.8K	ADJUST LCL SENSITIVITY
R470	1K - 30K	ADJUST LCL FLAG CURRENT

6. CIRCLED LETTERS DENOTE EYELET LOCATIONS SHOWN ON PRINTED-CIRCUIT BOARD.
7. VOLTAGES SHOWN ARE APPROXIMATE (±10%) AND ARE MEASURED UNDER THE FOLLOWING CONDITIONS:
   - A. UNITS INTERCONNECTED AS SHOWN IN FIGURE 3-5.
   - B. VOR INPUT SIGNAL AS NECESSARY TO ENERGIZE RELAY 1K401. COURSE SELECTOR SET TO 191.5° (ON COURSE "TO").
   - C. VOLTAGE MEASUREMENTS MADE WITH HEWLETT-PACKARD MODEL 410B (INPUT IMPEDANCE: DC, 122M; AC, 10M AND 1.5 μμF SHUNT).

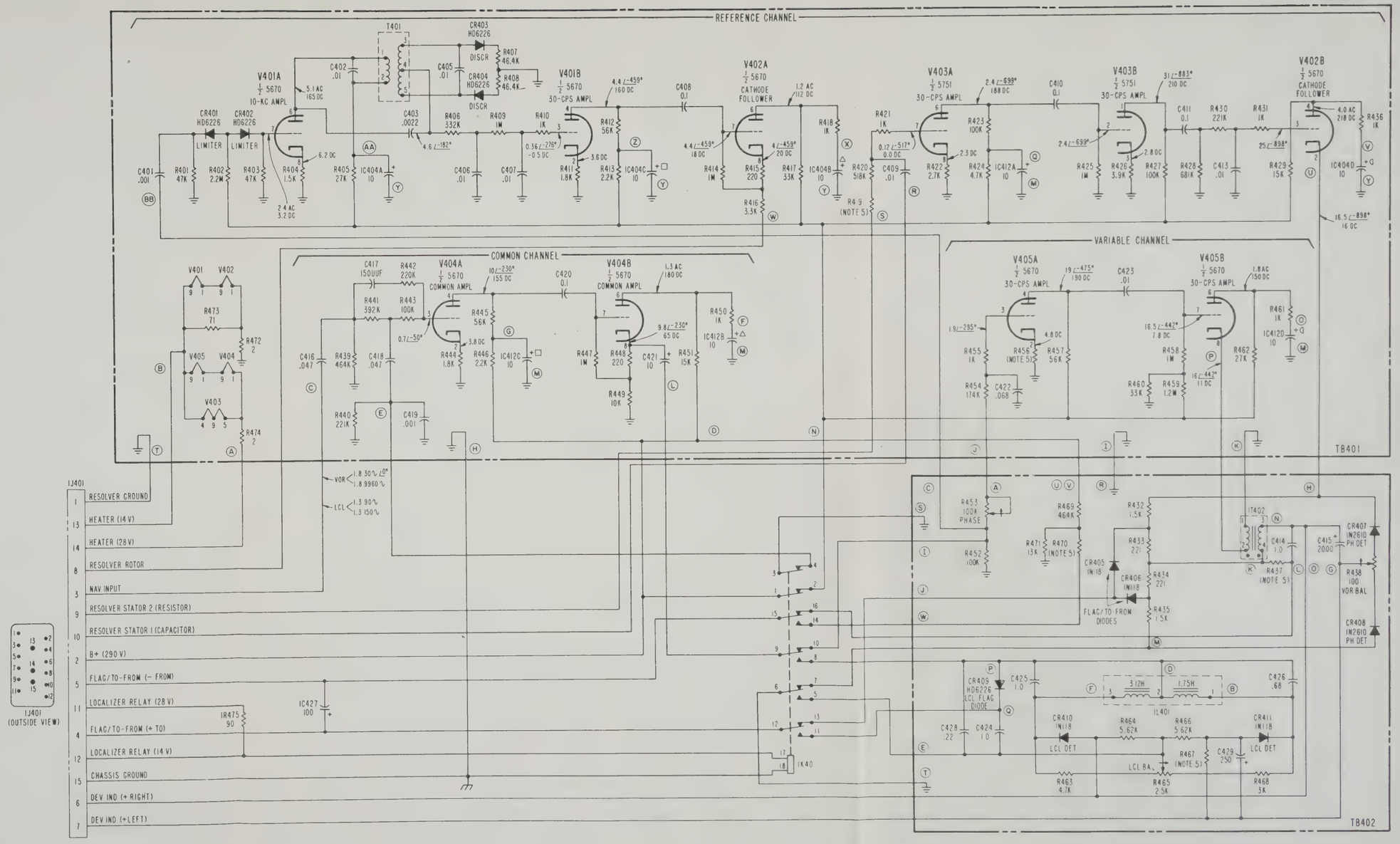
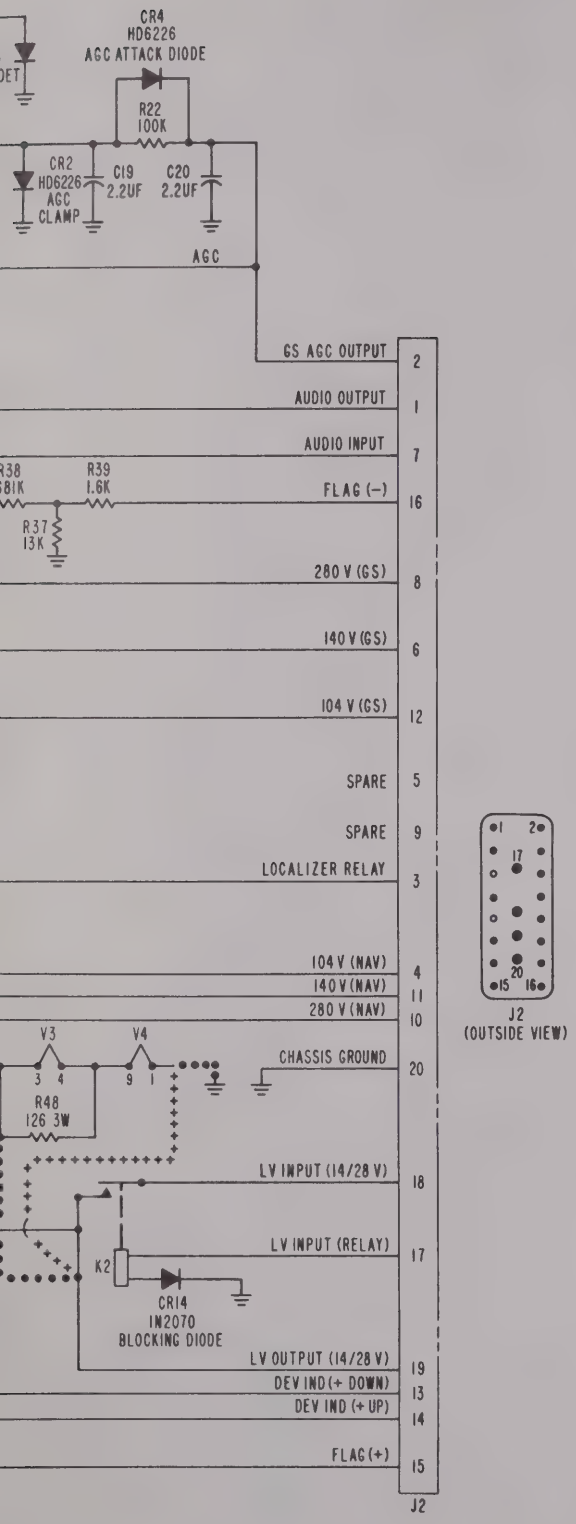


Figure 3-7. Converter, Schematic Diagram

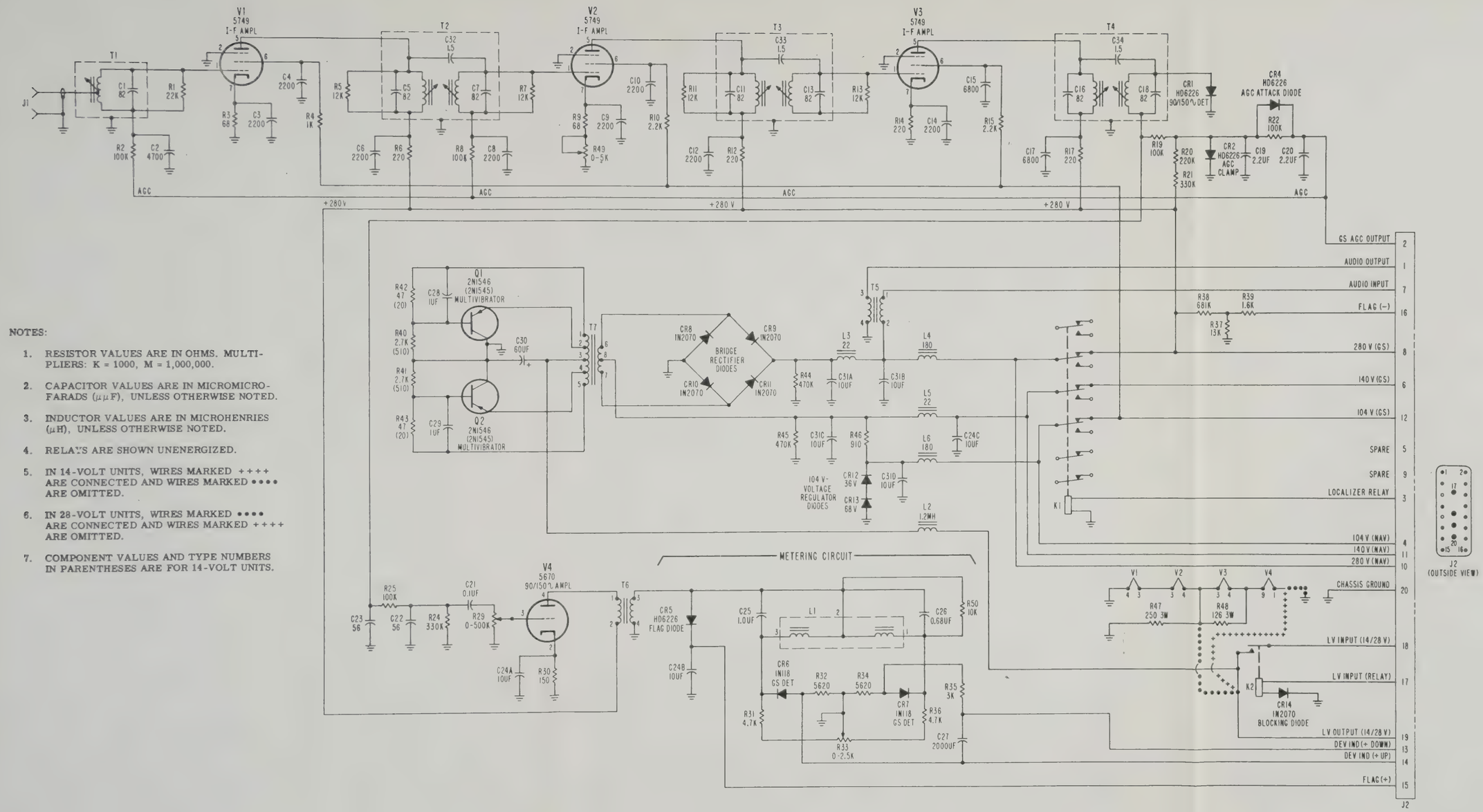


J2
(OUTSIDE VIEW)

CESSNA NAV/OMNI 500
Parts List

Reference Designation	DESCRIPTION	Part No.
	RECEIVER	
	CESSNA NAV/OMNI 500 PANEL UNIT	28310-1000
	MOUNTING - SINGLE UNIT (Unshock-mounted)	27591
	MOUNTING - SINGLE UNIT (Shock-mounted TSO)	26780
	MOUNTING - DUAL UNIT (Unshock-mounted)	27594
	MOUNTING - DUAL UNIT (Shock-mounted TSO)	26790
	CESSNA NAV/OMNI 500 INDICATOR	27510
C101	CAPACITOR ASSEMBLY	26730
C102	CAPACITOR, Variable, ceramic, 0.5 to 4.5 uuf, 500 vdcw	27651-0001
C103	CAPACITOR, Fixed, ceramic, 18 uuf ±5 per cent, 500 vdcw	27697-0180
C104	CAPACITOR, Fixed, ceramic, 560 uuf ±10 per cent, 500 vdcw	EW561
C105	CAPACITOR, Fixed, ceramic, 120 uuf ±5 per cent, 500 vdcw	27698-0121
C106	NOT USED	
C107	CAPACITOR, Fixed, ceramic, 560 uuf ±10 per cent, 500 vdcw	EW561
C108	CAPACITOR, Variable, same as C102	
C109	CAPACITOR, Fixed, ceramic, 0.47 uuf ±5 per cent, 500 vdcw	8879-9472
C110	CAPACITOR, Fixed, mica, 220 uuf ±5 per cent, 500 vdcw	VTDM-15-221J
C111	NOT USED	
C112	CAPACITOR, Variable, same as C102	
C113	CAPACITOR, Fixed, ceramic, 15 uuf ±5 per cent, 500 vdcw	27697-0150
C114	CAPACITOR, Fixed, mica, 51 uuf ±5 per cent, 500 vdcw	VTDM-15-510J
C115	CAPACITOR, Fixed, same as C107	
C116	NOT USED	
C117	CAPACITOR, Fixed, same as C107	
C118	NOT USED	
C119	NOT USED	
C120	CAPACITOR, Fixed, ceramic, 2200 uuf ±20 per cent, 500 vdcw	26825-0222
C121	CAPACITOR, Fixed, ceramic, 100 uuf ±5 per cent, 75 vdcw at +125 Deg C, 200 vdcw at +85 Deg C	28651-0101
C122	CAPACITOR, Fixed, same as C120	
C123	CAPACITOR, Fixed, ceramic (Value selected at time of final adjustment between 2 uuf and 4 uuf)	8879-*†
C124	CAPACITOR, Fixed, same as C120	
C125	CAPACITOR, Fixed, same as C121	
C126	CAPACITOR, Fixed, same as C120	
C127	CAPACITOR, Fixed, same as C121	
C128	CAPACITOR, Fixed, ceramic (value selected at time of final adjustment between 1 uuf and 3 uuf)	8879-*†
C129	CAPACITOR, Fixed, same as C120	
C130	CAPACITOR, Fixed, same as C121	
C131	CAPACITOR, Fixed, ceramic 1000 uuf ±10 per cent, 500 vdcw	EW102

† To complete part number, replace asterisk with value in uuf.



NOTES:

1. RESISTOR VALUES ARE IN OHMS. MULTIPLIERS: K = 1000, M = 1,000,000.
2. CAPACITOR VALUES ARE IN MICROMICROFARADS (μμF), UNLESS OTHERWISE NOTED.
3. INDUCTOR VALUES ARE IN MICROHENRIES (μH), UNLESS OTHERWISE NOTED.
4. RELAYS ARE SHOWN UNENERGIZED.
5. IN 14-VOLT UNITS, WIRES MARKED ++++ ARE CONNECTED AND WIRES MARKED •••• ARE OMITTED.
6. IN 28-VOLT UNITS, WIRES MARKED •••• ARE CONNECTED AND WIRES MARKED ++++ ARE OMITTED.
7. COMPONENT VALUES AND TYPE NUMBERS IN PARENTHESES ARE FOR 14-VOLT UNITS.

Figure 3-8. Dynaverter, Schematic Diagram

CESSNA NAV/OMNI 500
Parts List

Reference Designation	DESCRIPTION	Part No.
	RECEIVER	
	CESSNA NAV/OMNI 500 PANEL UNIT	28310-1000
	MOUNTING - SINGLE UNIT (Unshock-mounted)	27591
	MOUNTING - SINGLE UNIT (Shock-mounted TSO)	26780
	MOUNTING - DUAL UNIT (Unshock-mounted)	27594
	MOUNTING - DUAL UNIT (Shock-mounted TSO)	26790
	CESSNA NAV/OMNI 500 INDICATOR	27510
C101	CAPACITOR ASSEMBLY	26730
C102	CAPACITOR, Variable, ceramic, 0.5 to 4.5 uuf, 500 vdcw	27651-0001
C103	CAPACITOR, Fixed, ceramic, 18 uuf ±5 per cent, 500 vdcw	27697-0180
C104	CAPACITOR, Fixed, ceramic, 560 uuf ±10 per cent, 500 vdcw	EW561
C105	CAPACITOR, Fixed, ceramic, 120 uuf ±5 per cent, 500 vdcw	27698-0121
C106	NOT USED	
C107	CAPACITOR, Fixed, ceramic, 560 uuf ±10 per cent, 500 vdcw	EW561
C108	CAPACITOR, Variable, same as C102	
C109	CAPACITOR, Fixed, ceramic, 0.47 uuf ±5 per cent, 500 vdcw	8879-9472
C110	CAPACITOR, Fixed, mica, 220 uuf ±5 per cent, 500 vdcw	VTDM-15-221J
C111	NOT USED	
C112	CAPACITOR, Variable, same as C102	
C113	CAPACITOR, Fixed, ceramic, 15 uuf ±5 per cent, 500 vdcw	27697-0150
C114	CAPACITOR, Fixed, mica, 51 uuf ±5 per cent, 500 vdcw	VTDM-15-510J
C115	CAPACITOR, Fixed, same as C107	
C116	NOT USED	
C117	CAPACITOR, Fixed, same as C107	
C118	NOT USED	
C119	NOT USED	
C120	CAPACITOR, Fixed, ceramic, 2200 uuf ±20 per cent, 500 vdcw	26825-0222
C121	CAPACITOR, Fixed, ceramic, 100 uuf ±5 per cent, 75 vdcw at +125 Deg C, 200 vdcw at +85 Deg C	28651-0101
C122	CAPACITOR, Fixed, same as C120	
C123	CAPACITOR, Fixed, ceramic (Value selected at time of final adjustment between 2 uuf and 4 uuf)	8879-*†
C124	CAPACITOR, Fixed, same as C120	
C125	CAPACITOR, Fixed, same as C121	
C126	CAPACITOR, Fixed, same as C120	
C127	CAPACITOR, Fixed, same as C121	
C128	CAPACITOR, Fixed, ceramic (value selected at time of final adjustment between 1 uuf and 3 uuf)	8879-*†
C129	CAPACITOR, Fixed, same as C120	
C130	CAPACITOR, Fixed, same as C121	
C131	CAPACITOR, Fixed, ceramic 1000 uuf ±10 per cent, 500 vdcw	EW102

† To complete part number, replace asterisk with value in uuf.

Reference Designation	DESCRIPTION	Part No.
	RECEIVER -- Continued	
C132	CAPACITOR, Fixed, ceramic, 8 uuf ±5 per cent, 500 vdcw	27697-9801
C133	CAPACITOR, Fixed, ceramic, 27 uuf ±5 per cent, 500 vdcw	27697-0270
C134	CAPACITOR, Fixed, ceramic, 82 uuf ±5 per cent, 75 vdcw at +125 Deg C, 200 vdcw at +85 Deg C	28651-0820
C135	CAPACITOR, Fixed, ceramic, 4700 uuf ±20 per cent, 500 vdcw	EW472
C136	CAPACITOR, Fixed, ceramic, 71 uuf ±5 per cent, 75 vdcw at +125 Deg C, 200 vdcw at +85 Deg C	28651-0710
C137	CAPACITOR, Fixed, same as C135	
C138	CAPACITOR, Fixed same as C135	
C139	CAPACITOR, Fixed, same as C135	
C140	CAPACITOR, Fixed, same as C134	
C141	CAPACITOR, Fixed, same as C136	
C142	CAPACITOR, Fixed, same as C135	
C143	CAPACITOR, Fixed, electrolytic, 2 uf ±20 per cent, 150 vdcw	110D205X0150G0
C144	CAPACITOR, Fixed, same as C121	
C145	CAPACITOR, Fixed, plastic, 0.047 uf ±20 per cent, 300 vdcw	TWA3S47-10
C146	CAPACITOR, Fixed, ceramic, 56 uuf ±5 per cent, 75 vdcw at +125 Deg C, 200 vdcw at +85 Deg C	28651-0560
C147	CAPACITOR, Fixed, same as C110	
C148	NOT USED	
C149	CAPACITOR, Fixed, paper, 0.1 uf ±20 per cent, 200 vdcw	27726-9102
C150	CAPACITOR, Variable, glass, 0.5 to 4.5 uuf, 500 vdcw	680076
C151	CAPACITOR, Fixed, ceramic, 100 uuf ±5 per cent, 500 vdcw	27698-0101
C152	CAPACITOR, Fixed, same as C107	
C153	CAPACITOR, Fixed, ceramic, 51 uuf ±5 per cent, 500 vdcw	27698-0510
C154	CAPACITOR, Fixed, same as C107	
C155	CAPACITOR, Fixed, mica, 47 uuf ±5 per cent, 500 vdcw	VTDM-15-470J
C156	CAPACITOR, Fixed, same as C133	
C157	CAPACITOR, Fixed, same as C107	
C158	CAPACITOR, Fixed, ceramic, 56 uuf ±5 per cent, 500 vdcw	27697-0560
C159	CAPACITOR, Fixed, ceramic, 6 uuf ±5 per cent, 500 vdcw	27697-9601
C160	CAPACITOR, Fixed, ceramic, 12 uuf ±5 per cent, 500 vdcw	27697-0120
C161	CAPACITOR, Fixed, electrolytic, 1 uf ±20 per cent, 35 vdcw	150D105X0035A2
C162	CAPACITOR, Fixed, paper, 0.022 uf ±20 per cent, 400 vdcw	118P22304S4
C163	CAPACITOR, Fixed, electrolytic, 2 uf ±20 per cent, 150 vdcw	110D205X0150G1
C164	NOT USED	
C165	CAPACITOR, Fixed, paper, 0.047 uf ±20 per cent, 400 vdcw	196P47304S4
C166	CAPACITOR, Fixed, same as C165	
C167	CAPACITOR, Fixed, electrolytic, 0.1 uf ±20 per cent, 35 vdcw	150D104X0035A2

Reference Designation	DESCRIPTION	Part No.
	RECEIVER -- Continued	
C168	CAPACITOR, Fixed, ceramic, 6800 uuf ±20 per cent, 500 vdcw	EW682
C169	CAPACITOR, Fixed, ceramic, 4700 uuf ±10 per cent, 100 vdcw	GP4-472
C170	CAPACITOR, Fixed, ceramic, 1000 uuf ±20 per cent, 500 vdcw	EW102
C171	CAPACITOR, Fixed, same as C167	
C172	CAPACITOR, Fixed, electrolytic, 4.7 uf ±20 per cent, 35 vdcw	150D475X0035B2
C173	CAPACITOR, Fixed, electrolytic, 2.2 uf ±20 per cent, 35 vdcw	150D225X0035B2
C174	CAPACITOR, Fixed, ceramic, 560 uuf ±20 per cent, 500 vdcw	26825-0561
C175	CAPACITOR, Fixed, mica, 100 uuf ±5 per cent, 500 vdcw	VTDM-15-101J
C176	CAPACITOR, Fixed, same as C105	
C177	NOT USED	
C178	CAPACITOR, Fixed, Ceramic, 8 sections, 0.001 uf +100 -0 per cent, 1000 vdcw ea.	6S767
C179	CAPACITOR, Fixed, same as C178	
C180	CAPACITOR, Fixed, same as C178	
C181	CAPACITOR, Fixed, same as C178	
C182	CAPACITOR, Fixed, same as C178	
C183	CAPACITOR, Fixed, same as C178	
C184	CAPACITOR, Fixed, same as C178	
C185	CAPACITOR, Fixed, same as C174	
C186	CAPACITOR, Fixed, same as C145	
C187	CAPACITOR, Fixed, same as C107	
C188	CAPACITOR, Fixed, same as C159	
C189	CAPACITOR, Fixed, ceramic, 5 uuf ±5 per cent, 500 vdcw	27697-9501
C190	CAPACITOR, Fixed, ceramic, 7 uuf ±5 per cent, 500 vdcw	27697-9701
C191	CAPACITOR, Fixed, same as C178	
C192	CAPACITOR, Fixed, electrolytic, 4.7 uf ±20 per cent, 35 vdcw	150D475X0035B2
C193	CAPACITOR, Fixed, ceramic, 100 uuf ±5 per cent, 75 vdcw at +125 Deg C, 200 vdcw at +85 Deg C	28651-0101
C194	CAPACITOR, Fixed, same as C193	
C195	CAPACITOR, Fixed, same as C193	
C196	CAPACITOR, Fixed, ceramic, 5 uuf ±5 per cent, 500 vdcw	27696-9501
C197	CAPACITOR, Fixed, same as C153	
C198	CAPACITOR, Fixed, same as C145	
C199	CAPACITOR, Fixed, same as C107	
C200	CAPACITOR, Fixed, same as C168	
C201	CAPACITOR, Fixed, electrolytic, 1 uf ±20 per cent, 35 vdcw	150D105X0035A2
C202	NOT USED	
C203	CAPACITOR, Fixed, same as C107	
C204	CAPACITOR, Fixed, same as C107	
C205	NOT USED	
C206	CAPACITOR, Fixed, ceramic, 1 uuf ±5 per cent, 500 vdcw	8879-9101
C207	CAPACITOR, Fixed, ceramic, 1000 uuf +100 -0 per cent, 500 vdcw	SS5A102W
C208	CAPACITOR, Fixed, same as C207	
C209	CAPACITOR, Fixed, same as C206	
C210	CAPACITOR, Fixed, same as C207	
C211	CAPACITOR, Fixed, same as C207	

Reference Designation	DESCRIPTION	Part No.
	RECEIVER -- Continued	
C212	CAPACITOR, Fixed, same as C121	
C213	CAPACITOR, Fixed, ceramic, 3 uuf ±5 per cent, 500 vdcw	27697-9301
C214	CAPACITOR, Fixed, same as C207	
C215	CAPACITOR, Fixed, ceramic, 100 uuf ±5 per cent, 75 vdcw at +125 Deg C, 200 vdcw at +85 Deg C	28651-0101
C216	CAPACITOR, Fixed, same as C207	
C217	CAPACITOR, Fixed, same as C107	
C218	CAPACITOR, Fixed, same as C107	
C219	CAPACITOR, Fixed, same as C215	
C220	CAPACITOR, Fixed, same as C213	
C221	CAPACITOR, Fixed, same as C107	
C222	CAPACITOR, Fixed, same as C215	
C223	CAPACITOR, Fixed, ceramic, 82 uuf ±5 per cent, 75 vdcw at +125 Deg C, 200 vdcw at +85 Deg C	28651-0820
C224	CAPACITOR, Fixed, electrolytic, 2 uf ±20 per cent, 300 vdcw	110D205X0150G0
C225	CAPACITOR, Fixed, same as C168	
C226	CAPACITOR, Fixed, same as C160	
C227	CAPACITOR, Fixed, same as C158	
C228	CAPACITOR, Fixed, same as C107	
C229	CAPACITOR, Fixed, same as C107	
C230	NOT USED	
C231	CAPACITOR, Fixed, ceramic, 12 uuf ±5 per cent, 500 vdcw	27697-0120
C232	CAPACITOR, Fixed, same as C207	
C233	CAPACITOR, Fixed, same as C207	
C234	CAPACITOR, Fixed, ceramic, 1 uuf ±5 per cent, 500 vdcw	8879-9101
C235	NOT USED	
C236	CAPACITOR, Fixed, same as C120	
C237	CAPACITOR, Fixed, same as C113	
C238	CAPACITOR, Fixed, same as C120	
C239	CAPACITOR, Fixed, same as C158	
C240	CAPACITOR, Fixed, same as C120	
C241	NOT USED	
C242	CAPACITOR, Fixed, same as C207	
C243	CAPACITOR, Fixed, same as C207	
C244	CAPACITOR, Fixed, same as C207	
C245	CAPACITOR, Fixed, same as C207	
C246	CAPACITOR, Fixed, same as C207	
C247	CAPACITOR, Fixed, same as C207	
C248	CAPACITOR, Fixed, ceramic, 1 uuf ±0.25 per cent, 500 vdcw	8795-9101
C249	CAPACITOR, Fixed, ceramic, 2 uuf ±0.25 uuf, 500 vdcw	8791-9201
C250	CAPACITOR, Fixed, ceramic, 8 uuf ±5 per cent, 500 vdcw	27697-9801
CR101	DIODE	HD6226
CR102	DIODE	HD6226
CR103	NOT USED	
CR104	DIODE	HD6226
CR105	DIODE	HD6226
CR106	DIODE	HD6226
DS101	LAMP, Incandescent, midget flange base, T-1-3/4 bulb, red coated, 14v, 0.08 amp	330/R

Reference Designation	DESCRIPTION	Part No.
	RECEIVER -- Continued	
FL101	FILTER, Low pass	SMFO-2
FL102	FILTER, Low pass, same as FL101	
FL103	FILTER, Low pass, same as FL101	
FL104	FILTER, Low pass, same as FL101	
J101	CONNECTOR, Receptacle, electrical	8011-1
J102	CONNECTOR, Receptacle, electrical	UG-290A/U
J103	CONNECTOR, Receptacle, electrical	5035-1
L101	COIL	26718
L102	COIL	28144
L103	COIL	27131
L104	COIL	27018
L105	CHOKE, RF, 2.7 uh ±10 per cent	10100-636
L106	CHOKE, RF, 1.0 uh ±20 per cent	10100-630
L107	NOT USED	
L108	CHOKE, RF, 1.5 uh ±20 per cent	10100-632
L109	CHOKE, RF, 3 uh ±10 per cent	10100-652
L110	CHOKE, RF, same as L109	
L111	CHOKE, RF, same as L109	
L112	COIL ASSEMBLY, IF	28655-0001
L113	COIL ASSEMBLY, IF, same as L112	
L114	COIL ASSEMBLY, IF, same as L112	
L115	CHOKE, RF, 14 uh ±10 per cent	CF-Ir-7/16
L116	CHOKE, RF, 3.3 uh ±10 per cent	1537-24
L117	CHOKE, RF, same as L116	
L118	CHOKE, RF, same as L116	
L119	CHOKE, RF, same as L116	
L120	CHOKE RF, same as L116	
L121	CHOKE, RF, same as L116	
L122	CHOKE, RF, same as L116	
L123	CHOKE, RF, same as L116	
L124	CHOKE, RF, same as L116	
L125	CHOKE, RF, same as L116	
L126	CHOKE, RF, same as L116	
L127	CHOKE, RF, same as L116	
L128	CHOKE, RF, 15 uh ±10 per cent	10102-636
L129	REACTOR, 1000 uh ±5 per cent	28876-0102
L130	REACTOR, Same as L129	
L131	COIL ASSEMBLY	29216
L132	COIL ASSEMBLY, Same as L131	
L133	COIL ASSEMBLY, Same as L131	
L134	COIL ASSEMBLY, Same as L131	
L135	COIL ASSEMBLY	29218
L136	CHOKE, RF, 0.33 uh ±20 per cent	10100-624
L137	COIL ASSEMBLY	29219
L138	CHOKE, RF, same as L128	
L139	CHOKE, RF, same as L106	
P101	CONNECTOR ASSEMBLY, Consists of 27728, 25994-0004, and 28907	
R101	RESISTOR, Fixed, comp, 470,000 ohms ±10 per cent, 1/4 w	CB4741
R102	RESISTOR, Fixed, comp, 180 ohms ±10 per cent, 1/4 w	CB1811
R103	RESISTOR, Fixed, comp, 27 ohms ±5 per cent, 1/2 w	EB2705
R104	RESISTOR, Fixed, comp, 10,000 ohms ±10 per cent, 1/4 w	CB1031

Reference Designation	DESCRIPTION	Part No.
	RECEIVER -- Continued	
R105	RESISTOR, Fixed, comp, 12,000 ohms ±5 per cent, 1 w	GB1235
R106	RESISTOR, Fixed, comp, 330,000 ohms ±10 per cent, 1/4 w	CB3341
R107	RESISTOR, Fixed, comp, 1200 ohms ±10 per cent, 1/4 w	CB1221
R108	RESISTOR, Fixed, comp, 22,000 ohms ±10 per cent, 1/4 w	CB2231
R109	NOT USED	
R110	RESISTOR, Fixed, comp, 1500 ohms ±10 per cent, 1/4 w	CB1521
R111	RESISTOR, Fixed, comp, 1800 ohms ±10 per cent, 1/4 w	CB1821
R112	RESISTOR, Fixed, comp, 2200 ohms ±10 per cent, 1/4 w	CB2221
R113	NOT USED	
R114	RESISTOR, Fixed, same as R105	
R115	RESISTOR, Fixed, comp, 100,000 ohms ±10 per cent, 1/4 w	CB1041
R116	RESISTOR, Fixed, same as R115	
R117	RESISTOR, Fixed, comp, 820 ohms ±10 per cent, 1/4 w	CB8211
R118	RESISTOR, Fixed, comp, 150,000 ohms ±10 per cent, 1/4 w	CB1541
R119	RESISTOR, Fixed, same as R110	
R120	RESISTOR, Fixed, same as R118	
R121	RESISTOR, Fixed, comp, 680 ohms ±10 per cent, 1/4 w	CB6811
R122	RESISTOR, Fixed, comp, 12,000 ohms ±10 per cent, 1/4 w	CB1231
R123	RESISTOR, Fixed, comp, 68,000 ohms ±5 per cent, 1/2 w	EB6835
R124	RESISTOR, Fixed, same as R115	
R125	RESISTOR, Fixed, same as R110	
R126	RESISTOR, Fixed, same as R115	
R127	RESISTOR, Fixed, same as R115	
R128	RESISTOR, Fixed, comp, 270 ohms ±10 per cent, 1/4 w	CB2711
R129	RESISTOR, Variable, comp, 5000 ohms ±30 per cent, 0.3 w	27706-0502
R130	RESISTOR, Fixed, same as R115	
R131	RESISTOR, Fixed, same as R110	
R132	RESISTOR, Fixed, same as R115	
R133	RESISTOR, Fixed, comp, 390 ohms ±10 per cent, 1/4 w	CB3911
R134	RESISTOR, Fixed, same as R112	
R135	RESISTOR, Fixed, comp, (value selected at time of final adjustment) ±5 per cent, 1/4 w	341-*†
R136	RESISTOR, Fixed, comp, 68,000 ohms ±10 per cent, 1/4 w	CB6831
R137	RESISTOR, Fixed, comp, 33,000 ohms ±10 per cent, 1/4 w	CB3331
R138	RESISTOR, Fixed, comp, 2700 ohms ±5 per cent, 1/2 w	EB2725
R139	RESISTOR, Fixed, comp, 4700 ohms ±10 per cent, 1/4 w	CB4721
R140	RESISTOR, Fixed, comp, 15,000 ohms ±10 per cent, 1/4 w	CB1531
R141	NOT USED	
R142	RESISTOR, Fixed, comp, 220 ohms ±5 per cent, 1/4 w	CB2215

† To complete part number, replace asterisk with value in ohms.

Reference Designation	DESCRIPTION	Part No.
	RECEIVER -- Continued	
R143	RESISTOR, Fixed, same as R110	
R144	RESISTOR, Fixed, same as R115	
R145	RESISTOR, Fixed, same as R110	
R146	RESISTOR, Fixed, comp, 390,000 ohms ±10 per cent, 1/4 w	CB3941
R147	RESISTOR, Fixed, same as R136	
R148	RESISTOR, Fixed, comp, 220,000 ohms ±10 per cent, 1/4 w	CB2241
R149	RESISTOR, Fixed, same as R112	
R150	RESISTOR, Fixed, same as R115	
R151	RESISTOR, Fixed, same as R106	
R152	RESISTOR, Fixed, same as R148	
R153	RESISTOR, Fixed, comp, 6800 ohms ±10 per cent, 1/4 w	CB6821
R154	RESISTOR, Variable, comp, 10,000 ohms ±30 per cent, 0.3 w	28739-0103
R155	RESISTOR, Fixed, comp, 1 megohm ±10 per cent, 1/4 w	CB1051
R156	RESISTOR, Fixed, same as R155	
R157	RESISTOR, Fixed, comp, (value selected at time of final adjustment) ±5 per cent, 1/4 w	341-*†
R158	RESISTOR, Variable, comp, 250,000 ohms ±30 per cent, 0.1 w	27704-0254
R159	RESISTOR, Fixed, same as R148	
R160	RESISTOR, Fixed, same as R155	
R161	RESISTOR, Fixed, same as R155	
R162	RESISTOR, Fixed, same as R148	
R163	RESISTOR, Fixed, same as R115	
R164	RESISTOR, Fixed, comp, (value selected at time of final adjustment) ±5 per cent, 1/4 w	341-*†
R165	RESISTOR, Fixed, same as R115	
R166	RESISTOR, Fixed, same as R137	
R167	RESISTOR, Fixed, comp, 27,000 ohms ±10 per cent, 1/4 w	CB2731
R168	RESISTOR, Fixed, same as R122	
R169	RESISTOR, Fixed, same as R108	
R170	NOT USED	
R171	NOT USED	
R172	RESISTOR, Fixed, comp, (value selected at time of final adjustment) ±5 per cent, 1/4 w	341-*†
R173	RESISTOR, Fixed, comp, (value selected at time of final adjustment) ±5 per cent, 1/4 w	341-*†
R174	RESISTOR, Fixed, comp, 82 ohms ±5 per cent, 1 w	GB8205
R175	RESISTOR, Fixed, comp, 51 ohms ±5 per cent, 1 w	GB5105
R176	RESISTOR, Fixed, same as R115	
R177	RESISTOR, Fixed, comp, 330 ohms ±10 per cent, 1/4 w	CB3311
R178	RESISTOR, Fixed, same as R177	
R179	RESISTOR, Fixed, comp, 7500 ohms ±10 per cent, 1/4 w	CB7521
R180	RESISTOR, Fixed, same as R115	
R181	RESISTOR, Fixed, comp, 470 ohms ±10 per cent, 1/4 w	CB4711
R182	RESISTOR, Fixed, same as R148	
R183	RESISTOR, Fixed, same as R115	
R184	RESISTOR, Fixed, comp, 220 ohms ±10 per cent, 1/4 w	CB2211
R185	RESISTOR, Fixed, same as R140	
R186	RESISTOR, Fixed, same as R184	

† To complete part number, replace asterisk with value in ohms.

Reference Designation	DESCRIPTION	Part No.
	RECEIVER -- Continued	
R187	RESISTOR, Fixed, same as R102	
R188	RESISTOR, Fixed, comp, 16,000 ohms ±5 per cent, 1/2 w	EB1635
R189	NOT USED	
R190	RESISTOR, Fixed, comp, 150 ohms ±10 per cent, 1/4 w	CB1511
R191	RESISTOR, Fixed, same as R184	
R192	RESISTOR, Fixed, same as R108	
R193	NOT USED	
R194	RESISTOR, Fixed, same as R139	
R195	RESISTOR, Fixed, same as R104	
R196	RESISTOR, Fixed, same as R184	
R197	RESISTOR, Fixed, same as R139	
R198	RESISTOR, Fixed, comp, 68 ohms ±10 per cent, 1/4 w	CB6801
R199	RESISTOR, Fixed, same as R102	
R200	RESISTOR, Fixed, same as R184	
R201	RESISTOR, Fixed, same as R184	
R202	RESISTOR, Fixed, comp, 270 ohms ±5 per cent, 1 w	GB2715
S101	PRINTED CIRCUIT ASSEMBLY, Switch	29385
S102	PRINTED CIRCUIT ASSEMBLY, Switch	29284
S103	SWITCH, Sensitive, SPDT, 5 amps 250 vac, 2 amps 30 vdc	11SM1-T
S104	SWITCH, Rotary, DPCT, part of R158	27704-0254
S105	PRINTED CIRCUIT ASSEMBLY, Switch	29154
T101	FILTER ASSEMBLY, 20 mc	28713
T102	COIL, Universal wound	28859
T103	COIL, Universal wound	26404
T104	COIL, Universal wound	26403
T105	COIL, Universal wound, same as T104	
T106	COIL, Universal wound	27548
T107	COIL, Universal wound	29214
T108	COIL ASSEMBLY	29217
V101	ELECTRON TUBE	5654
V102	ELECTRON TUBE	5654
V103	ELECTRON TUBE	6922
V104	ELECTRON TUBE	5749
V105	ELECTRON TUBE	5794
V106	ELECTRON TUBE	5749
V107	ELECTRON TUBE	5749
V108	ELECTRON TUBE	5670
V109	ELECTRON TUBE	5814A
V110	ELECTRON TUBE	5751
V111	ELECTRON TUBE	5899
V112	ELECTRON TUBE	5899
V113	ELECTRON TUBE	5749
V114	ELECTRON TUBE	5670
V115	ELECTRON TUBE	6021
XDS101	LAMPHOLDER	4032-000-632
Y101	CRYSTAL, Quartz, 88.176 mc	26207-8817
Y102	CRYSTAL, Quartz, 89.176 mc	26207-8917
Y103	CRYSTAL, Quartz, 90.176 mc	26207-9017
Y104	CRYSTAL, Quartz, 91.176 mc	26207-9117
Y105	CRYSTAL, Quartz, 92.176 mc	26207-9217
Y106	CRYSTAL, Quartz, 93.176 mc	26207-9317

Reference Designation	DESCRIPTION	Part No.
	RECEIVER -- Continued	
Y107	CRYSTAL, Quartz, 94.176 mc	26207-9417
Y108	CRYSTAL, Quartz, 95.176 mc	26207-9517
Y109	CRYSTAL, Quartz, 96.176 mc	26207-9617
Y110	CRYSTAL, Quartz, 97.176 mc	26207-9717
Y111	CRYSTAL, Quartz, 98.176 mc	26207-9817
Y112	CRYSTAL, Quartz, 99.176 mc	26207-9917
Y113	CRYSTAL, Quartz, 100.176 mc	26207-1001
Y114	CRYSTAL, Quartz, 101.176 mc	26207-1011
Y115	CRYSTAL, Quartz, 102.176 mc	26207-1021
Y116	CRYSTAL, Quartz, 103.176 mc	26207-1031
Y117	CRYSTAL, Quartz, 104.176 mc	26207-1041
Y118	CRYSTAL, Quartz, 105.176 mc	26207-1051
Y119	CRYSTAL, Quartz, 106.176 mc	26207-1061
Y120	CRYSTAL, Quartz, 21.824 mc	26206-2182
Y121	CRYSTAL, Quartz, 21.874 mc	26206-2187
Y122	CRYSTAL, Quartz, 21.924 mc	26206-2192
Y123	CRYSTAL, Quartz, 21.974 mc	26206-2197
Y124	CRYSTAL, Quartz, 22.024 mc	26206-2202
Y125	CRYSTAL, Quartz, 22.074 mc	26206-2207
Y126	CRYSTAL, Quartz, 22.124 mc	26206-2212
Y127	CRYSTAL, Quartz, 22.174 mc	26206-2217
Y128	CRYSTAL, Quartz, 22.224 mc	26206-2222
Y129	CRYSTAL, Quartz, 22.274 mc	26206-2227
Y130	CRYSTAL, Quartz, 22.324 mc	26206-2232
Y131	CRYSTAL, Quartz, 22.374 mc	26206-2237
Y132	CRYSTAL, Quartz, 22.424 mc	26206-2242
Y133	CRYSTAL, Quartz, 22.474 mc	26206-2247
Y134	CRYSTAL, Quartz, 22.524 mc	26206-2252
Y135	CRYSTAL, Quartz, 22.574 mc	26206-2257
Y136	CRYSTAL, Quartz, 22.624 mc	26206-2262
Y137	CRYSTAL, Quartz, 22.674 mc	26206-2267
Y138	CRYSTAL, Quartz, 22.724 mc	26206-2272
Y139	CRYSTAL, Quartz, 22.774 mc	26206-2277
Y140	CRYSTAL, Quartz, 1.545 mc	19233-1545
Y141	CRYSTAL, Quartz, 50.783 mc	19658-5078
Y142	CRYSTAL, Quartz, 49.883 mc	19658-4988
Y143	CRYSTAL, Quartz, 50.083 mc	19658-5008
Y144	CRYSTAL, Quartz, 49.983 mc	19658-4998
Y145	CRYSTAL, Quartz, 50.683 mc	19658-5068
Y146	CRYSTAL, Quartz, 50.233 mc	19658-5023
Y147	CRYSTAL, Quartz, 50.633 mc	19658-5063
Y148	CRYSTAL, Quartz, 50.533 mc	19658-5053
Y149	CRYSTAL, Quartz, 50.433 mc	19658-5043
Y150	CRYSTAL, Quartz, 50.333 mc	19658-5033
Y151	CRYSTAL, Quartz, 50.733 mc	19658-5073
Y152	CRYSTAL, Quartz, 50.133 mc	19658-5013
Y153	CRYSTAL, Quartz, 50.033 mc	19658-5003
Y154	CRYSTAL, Quartz, 49.933 mc	19658-4993
Y155	CRYSTAL, Quartz, 50.833 mc	19658-5083
Y156	CRYSTAL, Quartz, 50.283 mc	19658-5028
Y157	CRYSTAL, Quartz, 50.183 mc	19658-5018
Y158	CRYSTAL, Quartz, 50.583 mc	19658-5058
Y159	CRYSTAL, Quartz, 50.483 mc	19658-5048
Y160	CRYSTAL, Quartz, 50.383 mc	19658-5038
Y161	CRYSTAL, Quartz, 28.3 mc	19658-2830
Z101	FILTER ASSEMBLY	29351
Z102	FILTER ASSEMBLY	29352
Z103	FILTER ASSEMBLY	29353
Z104	FILTER ASSEMBLY, Same as Z102	
Z105	FILTER ASSEMBLY	29355

Reference Designation	DESCRIPTION	Part No.
	Receiver - Continued	
Z106	REACTOR	30167
	DYNAVERTER	
	CESSNA NAV/OMNI 500 DYNAVERTER - 14 v	28300-0014
	CESSNA NAV/OMNI 500 DYNAVERTER - 24 v	28300-0028
	MOUNTING - DYNAVERTER	24900
C1	CAPACITOR, Fixed, ceramic, 82 uuf ±5 per cent, 75 vdcw at ±125 Deg C, 200 vdcw at +85 Deg C	28651-0320
C2	CAPACITOR, Fixed, ceramic, 4700 uuf ±20 per cent, 500 vdcw	EW472
C3	CAPACITOR, Fixed, ceramic, 2200 uuf ±20 per cent, 500 vdcw	EW222
C4	CAPACITOR, Fixed, same as C3	
C5	CAPACITOR, Fixed, same as C1	
C6	CAPACITOR, Fixed, same as C3	
C7	CAPACITOR, Fixed, same as C1	
C8	CAPACITOR, Fixed, same as C3	
C9	CAPACITOR, Fixed, same as C3	
C10	CAPACITOR, Fixed, same as C3	
C11	CAPACITOR, Fixed, same as C1	
C12	CAPACITOR, Fixed, same as C3	
C13	CAPACITOR, Fixed, same as C1	
C14	CAPACITOR, Fixed, same as C3	
C15	CAPACITOR, Fixed, ceramic, 6800 uuf ±20 per cent, 500 vdcw	EW682
C16	CAPACITOR, Fixed, same as C1	
C17	CAPACITOR, Fixed, same as C15	
C18	CAPACITOR, Fixed, same as C1	
C19	CAPACITOR, Fixed, electrolytic, 2.2 uf ±20 per cent, 35 vdcw	150D225X0035B2
C20	CAPACITOR, Fixed, same as C19	
C21	CAPACITOR, Fixed, electrolytic, 0.1 uf ±20 per cent, 35 vdcw	150D104X0035A2
C22	CAPACITOR, Fixed, ceramic, 56 uuf ±5 per cent, 500 vdcw	27697-0560
C23	CAPACITOR, Fixed, same as C22	
C24	CAPACITOR, Fixed, electrolytic, four sections, 10 uf +50 -10 per cent, 450 vdcw each section	27153
C25	CAPACITOR, Fixed, paper, 1 uf ±5 per cent, 100 vdcw	26054-9101
C26	CAPACITOR, Fixed, paper, 0.68 uf ±5 per cent, 100 vdcw	26054-9682
C27	CAPACITOR, Fixed, electrolytic, 2000 uf, 2.5 vdcw	DES2000
C28	CAPACITOR, Fixed, plastic, 1 uf ±10 per cent, 100 vdcw	26053-9101
C29	CAPACITOR, Fixed, same as C28	
C30	CAPACITOR, Fixed, electrolytic, 60 uf +75 -15 per cent, 50 vdcw	F310
C31	CAPACITOR, Fixed, same as C24	
CR1	DIODE	HD6226
CR2	DIODE	HD6226
CR3	DIODE	HD6226
CR4	NOT USED	
CR5	DIODE	HD6226
CR6	DIODE	1N118

Reference Designation	DESCRIPTION	Part No.
	Dynaverter -- Continued	
CR7	DIODE	1N118
CR8	DIODE	1N2070
CR9	DIODE	1N2070
CR10	DIODE	1N2070
CR11	DIODE	1N2070
CR12	DIODE	1N1826
CR13	DIODE	1N1833
CR14	DIODE	1N2070
J1	CONNECTOR, Receptacle, electrical	UG-290A/U
J2	CONNECTOR, Receptacle, electrical	126-806
K1	RELAY, Armature (used in 14 v model)	29159-0014
K1	RELAY, Armature (used in 28 v model)	29159-0028
K2	RELAY, Armature (used in 14 v model)	14484
K2	RELAY, Armature (used in 28 v model)	14485
L1	COIL ASSEMBLY	AF-938
L2	REACTOR, 1.2 mh	21429
L3	COIL, RF, 22 mh ±20 per cent	05-22
L4	COIL, RF, 180 uh ±10 per cent	3500-14
L5	COIL, RF, same as L3	
L6	COIL, RF, same as L4	
Q1	TRANSISTOR, (used in 14 v model)	2N1545
Q1	TRANSISTOR, (used in 28 v model)	2N1546
Q2	TRANSISTOR, Same as Q1 (used in 14 v model)	
Q2	TRANSISTOR, Same as Q1 (used in 28 v model)	
R1	RESISTOR, Fixed, comp, 22,000 ohms ±5 per cent, 1/2 w	EB2235
R2	RESISTOR, Fixed, comp, 100,000 ohms ±10 per cent, 1/4 w	CB1041
R3	RESISTOR, Fixed, comp, 68 ohms ±10 per cent, 1/4 w	CB6801
R4	RESISTOR, Fixed, comp, 1000 ohms ±10 per cent, 1/4 w	CB1021
R5	RESISTOR, Fixed, comp, 12,000 ohms ±5 per cent, 1/2 w	EB1235
R6	RESISTOR, Fixed, comp, 220 ohms ±10 per cent, 1/4 w	CB2211
R7	RESISTOR, Fixed, same as R5	
R8	RESISTOR, Fixed, same as R2	
R9	RESISTOR, Fixed, same as R3	
R10	RESISTOR, Fixed, same as R6	
R11	RESISTOR, Fixed, same as R5	
R12	RESISTOR, Fixed, same as R6	
R13	RESISTOR, Fixed, same as R5	
R14	RESISTOR, Fixed, same as R6	
R15	RESISTOR, Fixed, comp, 2200 ohms ±10 per cent, 1/4 w	CB2221
R16	NOT USED	
R17	RESISTOR, Fixed, same as R6	
R18	NOT USED	
R19	RESISTOR, Fixed, same as R2	
R20	RESISTOR, Fixed, comp, 220,000 ohms ±10 per cent, 1/4 w	CB2241
R21	RESISTOR, Fixed, comp, 330,000 ohms ±10 per cent, 1/4 w	CB3341
R22	RESISTOR, Fixed, same as R2	
R23	NOT USED	

Reference Designation	DESCRIPTION	Part No.
	Dynaverter -- Continued	
R24	RESISTOR, Fixed, Same as R21	
R25	RESISTOR, Fixed, same as R2	
R26	NOT USED	
R27	NOT USED	
R28	NOT USED	
R29	RESISTOR, Variable, comp, 500,000 ohms ±20 per cent, 1/2 w	GLU5042SD3028L
R30	RESISTOR, Fixed, comp, 150 ohms ±10 per cent, 1/4 w	CB1511
R31	RESISTOR, Fixed, comp, 4700 ohms ±5 per cent, 1/2 w	EB4725
R32	RESISTOR, Fixed, film, 5620 ohms ±1 per cent, 1/2 w	205-0043
R33	RESISTOR, Variable, comp, 2500 ohms ±20 per cent, 1/2 w	GLU2522SD3028L
R34	RESISTOR, Fixed, same as R32	
R35	RESISTOR, Fixed, comp, 3000 ohms ±5 per cent, 1/2 w	EB3025
R36	RESISTOR, Fixed, same as R31	
R37	RESISTOR, Fixed, film, 13,000 ohms ±1 per cent, 1/2 w	205-0133
R38	RESISTOR, Fixed, film, 681,000 ohms ±1 per cent, 1/2 w	205-0045
R39	RESISTOR, Fixed, comp, 1600 ohms ±5 per cent, 1/2 w	EB1625
R40	RESISTOR, Fixed, comp, 510 ohms ±5 per cent, 1 w (used in 14 v model)	GB5115
R40	RESISTOR, Fixed, comp, 2700 ohms ± 5 per cent, 1 w (used in 28 v model)	GB2725
R41	RESISTOR, Fixed, same as R40 (used in 14 v model)	
R41	RESISTOR, Fixed, same as R40 (used in 28 v model)	
R42	RESISTOR, Fixed, comp, 20 ohms ±5 per cent, 1/2 w (used in 14 v model)	EB2005
R42	RESISTOR, Fixed, comp, 47 ohms ±5 per cent, 1/2 w (used in 28 v model)	EB4705
R43	RESISTOR, Fixed, same as R42 (used in 14 v model)	
R43	RESISTOR, Fixed, same as R42 (used in 28 v model)	
R44	RESISTOR, Fixed, comp, 470,000 ohms ±5 per cent, 1/2 w	EB4745
R45	RESISTOR, Fixed, same as R44	
R46	RESISTOR, Fixed, comp, 910 ohms ±5 per cent, 2 w	HB9115
R47	RESISTOR, Fixed, ww, 250 ohms ±3 per cent, 3 w	209-0251
R48	RESISTOR, Fixed, ww, 126 ohms ±3 per cent, 3 w	209-0006
R49	RESISTOR, Variable, comp, 5000 ohms ±20 per cent, 1/2 w	GLU5022SD3028L
R50	RESISTOR, Fixed, comp, 10,000 ohms ±5 per cent, 1/2 w	EB1035
T1	COIL, Universal wound	29214
T2	COIL, Universal wound	29215
T3	COIL, Universal wound, same as T2	
T4	COIL, Universal wound, same as T2	

Reference Designation	DESCRIPTION	Part No.
	Dynaverter -- Continued	
T5	TRANSFORMER, Audio	4532
T6	TRANSFORMER, Audio	28573
T7	TRANSFORMER, Toroidal (used in 14 v model)	26484
T7	TRANSFORMER, Toroidal (used in 28 v model)	26485
V1	ELECTRON TUBE	5749
V2	ELECTRON TUBE	5749
V3	ELECTRON TUBE	5749
V4	ELECTRON TUBE	5670
	CONVERTER	
	CESSNA NAV/OMNI 500 CONVERTER	24660
	MOUNTING - CONVERTER	24900
C401	CAPACITOR, Fixed, mica, 1000 uuf ± 5 per cent, 500 vdcw	27513-0102
C402	CAPACITOR, Fixed, mica, 0.01 uf ±1 per cent, 300 vdcw	DM19
C403	CAPACITOR, Fixed, mica, 2200 uuf ±5 per cent, 500 vdcw	27513-0222
C404	CAPACITOR, Fixed, electrolytic, 4 sections, 10 uf +50 -10 per cent, 450 vdcw each section	27153
C405	CAPACITOR, Fixed, same as C402	
C406	CAPACITOR, Fixed, same as C402	
C407	CAPACITOR, Fixed, same as C402	
C408	CAPACITOR, Fixed, plastic, 0.1 uf ±10 per cent, 400 vdcw	26055-9102
C409	CAPACITOR, Fixed, same as C402	
C410	CAPACITOR, Fixed, same as C408	
C411	CAPACITOR, Fixed, same as C408	
C412	CAPACITOR, Fixed, same as C404	
C413	CAPACITOR, Fixed, same as C402	
C414	CAPACITOR, Fixed, plastic 1 uf ±10 per cent, 100 vdcw	26053-9101
C415	CAPACITOR, Fixed, electrolytic, 2000 uf, 2.5 vdcw	DES2000
C416	CAPACITOR, Fixed, paper, 0.047 uf ±5 per cent, 100 vdcw	26054-9473
C417	CAPACITOR, Fixed, mica, 150 uuf ±5 per cent, 500 vdcw	DM15-150
C418	CAPACITOR, Fixed, same as C416	
C419	CAPACITOR, Fixed, same as C401	
C420	CAPACITOR, Fixed, same as C408	
C421	CAPACITOR, Fixed, electrolytic, 10 uf +75 -15 per cent, 100 vdcw	109D106C7100F2
C422	CAPACITOR, Fixed, paper, 0.068 uf ±5 per cent, 100 vdcw	26054-9683
C423	CAPACITOR, Fixed, mica, 0.01 uf ±1 per cent, 500 vdcw	DM35
C424	CAPACITOR, Fixed, same as C414	
C425	CAPACITOR, Fixed, paper, 1 uf ± 5 per cent, 100 vdcw	26054-9101
C426	CAPACITOR, Fixed, paper, 0.68 uf ±5 per cent, 100 vdcw	26054-9682
C427	CAPACITOR, Fixed, electrolytic, 100 uf +100 -10 per cent, 3 vdcw	40D114A2

Reference Designation	DESCRIPTION	Part No.
	Converter -- Continued	
C428	CAPACITOR, Fixed, plastic, 0.22 uf ±20 per cent, 50 vdcw	601PE2230R54
C429	CAPACITOR, Fixed, electrolytic, 250 uf +30 -10 per cent, 3 vdcw	40D118A2
CR401	DIODE	HD6226
CR402	DIODE	HD6226
CR403	DIODE	HD6226
CR404	DIODE	HD6226
CR405	DIODE	1N118
CR406	DIODE	1N118
CR407	DIODE	1N2610
CR408	DIODE	1N2610
CR409	DIODE	HD6226
CR410	DIODE	1N118
CR411	DIODE	1N118
J401	CONNECTOR, Receptacle, electrical	126-151
K401	RELAY, Armature	29626-0014
L401	REACTOR	AF-938
R401	RESISTOR, Fixed, comp, 47,000 ohms ±5 per cent, 1/2 w	EB4735
R402	RESISTOR, Fixed, comp, 2.2 megohms ±5 per cent, 1/2 w	EB2255
R403	RESISTOR, Fixed, same as R401	
R404	RESISTOR, Fixed, comp, 1500 ohms ±5 per cent, 1/2 w	EB1525
R405	RESISTOR, Fixed, comp, 27,000 ohms ±5 per cent, 1 w	GB2735
R406	RESISTOR, Fixed, film, 332,000 ohms ±1 per cent, 2 w	DA-4B3323F
R407	RESISTOR, Fixed, film, 46,400 ohms ±1 per cent, 1/2 w	CD1/2PR46400F
R408	RESISTOR, Fixed, same as R407	
R409	RESISTOR, Fixed, film, 1 megohm ±1 per cent, 1/2 w	CD1/2PR105F
R410	RESISTOR, Fixed, comp, 1000 ohms ± 5 per cent, 1/2 w	EB1025
R411	RESISTOR, Fixed, comp, 1800 ohms ±5 per cent, 1/2 w	EB1825
R412	RESISTOR, Fixed, comp, 56,000 ohms ±5 per cent, 1 w	GB5635
R413	RESISTOR, Fixed, comp, 2200 ohms ±5 per cent, 1/4 w	CB2225
R414	RESISTOR, Fixed, comp, 1 megohm ±5 per cent, 1/4 w	CB1055
R415	RESISTOR, Fixed, comp, 220 ohms ±5 per cent, 1/2 w	EB2215
R416	RESISTOR, Fixed, comp, 3300 ohms ±5 per cent, 1/2 w	EB3325
R417	RESISTOR, Fixed, comp, 33,000 ohms ±5 per cent, 1 w	GB3335
R418	RESISTOR, Fixed, comp, 1000 ohms ±5 per cent, 1/4 w	CB1025
R419	RESISTOR, Fixed, comp, (value selected at time of final adjustment) ±5 per cent, 1/2 w	201-*†
R420	RESISTOR, Fixed, film, 518,000 ohms ±1 per cent, 1/2 w	28255-5185

† To complete part number, replace asterisk with value in ohms.

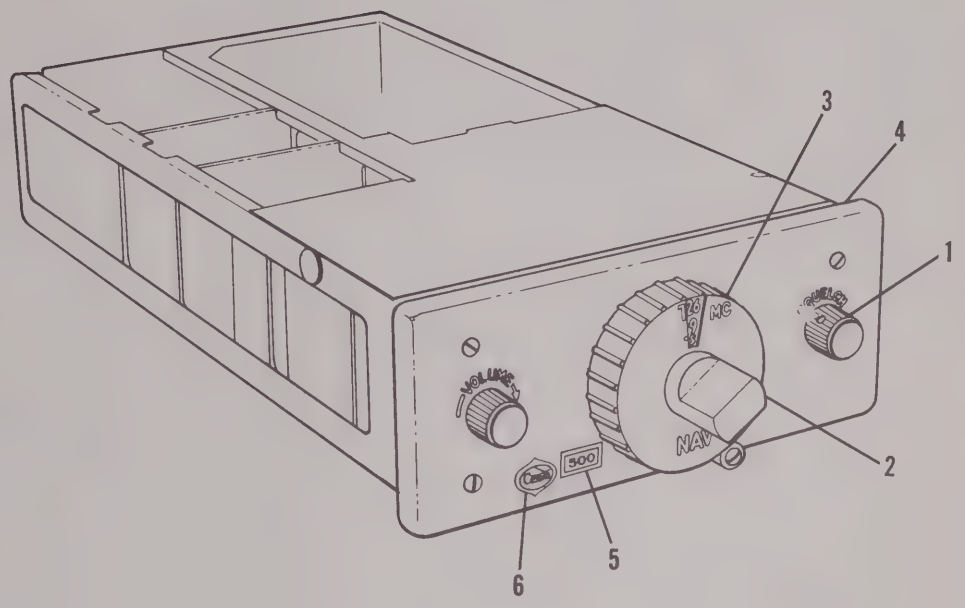
Reference Designation	DESCRIPTION	Part No.
	Converter -- Continued	
R421	RESISTOR, Fixed, same as R410	
R422	RESISTOR, Fixed, comp, 2700 ohms ±5 per cent, 1/2 w	EB2725
R423	RESISTOR, Fixed, comp, 100,000 ohms ±5 per cent, 1/2 w	EB1045
R424	RESISTOR, Fixed, comp, 4700 ohms ±5 per cent, 1/4 w	CB4725
R425	RESISTOR, Fixed, same as R409	
R426	RESISTOR, Fixed, comp, 3900 ohms ±5 per cent, 1/2 w	EB3925
R427	RESISTOR, Fixed, same as R423	
R428	RESISTOR, Fixed, film, 681,000 ohms ±1 per cent, 1/2 w	CD1/2PR6813F
R429	RESISTOR, Fixed, comp, 15,000 ohms ±5 per cent, 2 w	HB1535
R430	RESISTOR, Fixed, film, 221,000 ohms ±1 per cent, 2 w	DA-4B2213F
R431	RESISTOR, Fixed, same as R418	
R432	RESISTOR, Fixed, film, 1500 ohms ±1 per cent, 1/2 w	CD1/2PR152F
R433	RESISTOR, Fixed, film, 221 ohms ±1 per cent, 1/2 w	CD1/2PR221F
R434	RESISTOR, Fixed, same as R433	
R435	RESISTOR, Fixed, same as R432	
R436	RESISTOR, Fixed, same as R418	
R437	RESISTOR, Fixed, comp, (value selected at time of final adjustment) ±5 per cent, 1/4 w	341-*†
R438	RESISTOR, Variable, comp, 100 ohms ±20 per cent, 1/2 w	65LT101M
R439	RESISTOR, Fixed, film, 464,000 ohms ±1 per cent, 1/2 w	CD1/2PR4643F
R440	RESISTOR, Fixed, film, 221,000 ohms ±1 per cent, 1/2 w	CD1/2PR2213F
R441	RESISTOR, Fixed, film, 392,000 ohms ±1 per cent, 1/2 w	CD1/2PR3923F
R442	RESISTOR, Fixed, comp, 220,000 ohms ±5 per cent, 1/2 w	EB2245
R443	RESISTOR, Fixed, same as R423	
R444	RESISTOR, Fixed, same as R411	
R445	RESISTOR, Fixed, same as R412	
R446	RESISTOR, Fixed, same as R413	
R447	RESISTOR, Fixed, comp, 1 megohm ±5 per cent, 1/2 w	EB1055
R448	RESISTOR, Fixed, same as R415	
R449	RESISTOR, Fixed, comp, 10,000 ohms ± 5 per cent, 1 w	GB1035
R450	RESISTOR, Fixed, same as R418	
R451	RESISTOR, Fixed, comp, 15,000 ohms ±5 per cent, 1 w	GB1535
R452	RESISTOR, Fixed, comp, 100,000 ohms ± 5 per cent, 1/2 w	EB1045
R453	RESISTOR Variable, comp, 100,000 ohms ±20 per cent, 1/2 w	65LT104M
R454	RESISTOR, Fixed, film, 174,000 ohms ±1 per cent, 1/2 w	CD1/2PR1743F
R455	RESISTOR, Fixed, same as R410	
R456	RESISTOR, Fixed, comp, (value selected at time of final adjustment) ±5 per cent, 1/2 w	201-*†
R457	RESISTOR, Fixed, same as R412	
R458	RESISTOR, Fixed, Same as R409	

† To complete part number, replace asterisk with value in ohms.

Reference Designation	DESCRIPTION	Part No.
	Converter -- Continued	
R459	RESISTOR, Fixed, comp, 1.2 megohms ±5 per cent, 1/2 w	EB1255
R460	RESISTOR Fixed, comp, 33,000 ohms ±5 per cent, 1/2 w	EB3335
R461	RESISTOR, Fixed, same as R418	
R462	RESISTOR, Fixed, comp, 27,000 ohms ±5 per cent, 2 w	HB2735
R463	RESISTOR Fixed, comp, 4700 ohms ±5 per cent, 1/2 w	EB4725
R464	RESISTOR, Fixed, film, 5620 ohms ±1 per cent, 1/2 w	CD1/2PR5621F
R465	RESISTOR, Variable, comp, 2500 ohms ±20 per cent, 1/2 w	65LT252M
R466	RESISTOR, Fixed, same as R464	
R467	RESISTOR, Fixed, comp, (value selected at time of final adjustment) ±5 per cent, 1/2 w	201-*†
R468	RESISTOR, Fixed, comp, 3000 ohms ±5 per cent, 1/2 w	EB3025
R469	RESISTOR, Fixed, same as R439	
R470	RESISTOR, Fixed, comp, (value selected at time of final adjustment) ±5 per cent, 1/2 w	201-*†
R471	RESISTOR, Fixed, film, 13,000 ohms ±1 per cent, 1/2 w	CD1/2PR133M
R472	RESISTOR, Fixed, ww, 2 ohms ±10 per cent, 2 w	CS-2A
R473	RESISTOR, Fixed, ww, 71 ohms ±3 per cent, 3 w	RS-2-710H
R474	RESISTOR, Fixed, same as R472	
R475	RESISTOR, Fixed, ww, 90 ohms ±3 per cent, 3 w	RS-2-900H
T401	TRANSFORMER, Discriminator	25917
T402	TRANSFORMER	26447
V401	ELECTRON TUBE	5670
V402	ELECTRON TUBE	5670
V403	ELECTRON TUBE	5751
V404	ELECTRON TUBE	5670
V405	ELECTRON TUBE	5670

† To complete part number, replace asterisk with value in ohms.

CESSNA NAV/OMNI 500
Replaceable Panel Parts



Item No.	Part No.	1 2 3 4 5 6 Description	Units Per Assembly
1	26989	KNOB	2
		ATTACHING PARTS	
	COMM	SETSCREW - 4-40x1/8" Long	2
	13527	WASHER - Spring Tension	1
		---*---	
2	29241	KNOB ASSY (Includes knob, plate and dial)	1
		ATTACHING PARTS	
	COMM	SETSCREW 4-40x3/16" Long	2
	7984	SPRING WASHER	1
	COMM	WASHER	1
		---*---	
3	27015	DIAL, PRINTED	1
		ATTACHING PARTS	
	COMM	SETSCREW - 4-40x3/16" Long	2
		---*---	
4	28377	PLATE ASSY, Printed	1
		ATTACHING PARTS	
	COMM	SCREW	4
		---*---	
5	S-1464-500	DECAL	1
6	S-1467-1	BUTTON	1
		NOTE: REFER TO SECTION I FOR PARTS BREAKDOWN OF PANEL SHOCKMOUNT.	

Figure 3-10. Replaceable Panel Parts

SECTION 4

CESSNA ADF 500

LIST OF REVISED PAGES ISSUED

INSERT LATEST REVISED PAGES. DESTROY SUPERSEDED PAGES.

CESSNA ADF 500

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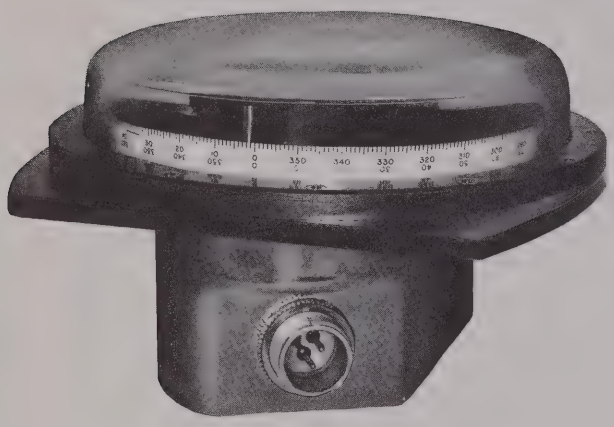
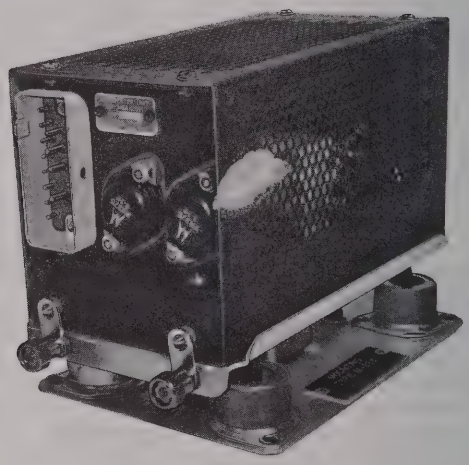
25400-1000 RECEIVER
WITH
27591 MOUNTING



18000 LOOP



26960-0014 DYNAVERTER
26960-0028 DYNAVERTER
WITH
21650 MOUNTING

27470 INDICATOR

27500 INDICATOR

Figure 4-1. Cessna ADF 500, Major Units

CESSNA ADF 500

General Information

INTRODUCTION

This Section contains installation operation and maintenance information for the Cessna ADF 500.

PURPOSE

The Cessna ADF 500 is a panel-mounted, lightweight, airborne radio compass set which automatically provides a visual bearing indication of the direction from which an r-f signal is being received. It can be used for position plotting, homing, and aural reception of amplitude-modulated signals. The ADF 500 operates in the frequency range of 190 to 1750 kc, divided into three bands as follows: 190 to 400 kc, 400 to 840 kc, and 840 to 1750 kc.

SPECIFICATIONS

General Characteristics

Frequency: 190 to 1750 kc

Tuning Bands: 190 to 400 kc, 400 to 840 kc, 840 to 1750 kc

Types of Operation:

COMP - Automatic direction finder operation using both loop and sense antennas

ANT - Radio range and broadcast reception using sense antenna only

Total Input Power:

With Dynaverter: 4.4 amperes at 13.75 volts dc or 2.05 amperes at 27.5 volts dc.

Certification: FAA TSO C41a, Category B*

Receiver

Circuit: 14 tube superheterodyne

Sensitivity:

Antenna MCW: 4 to 10 μv in series with 50 $\mu\mu$f capacitance through standard input cable of 100 μf for a 6 db S+N/N output ratio

Compass: 10 to 25 μv/meter for a maximum of 2° error and ±2° jitter

Image Rejection: At 190 kc, greater than 100 db; at 1750 kc, greater than 70 db

i-f Rejection: At 190 kc, greater than 85 db; at 1750 kc, greater than 100 db

Bandwidth: (kc off resonance modulated 30 per cent at 1000 cps): At 6 db, 1.6 to 2.8 kc (depending on frequency from 190 to 1750 kc); at 60 db, 4.2 to 8.5 kc (depending on frequency from 190 to 1750 kc)

Intermediate Frequency: 142.5 kc

a-f Power Output: Approximately 1 watt into 300 ohms

Mounting: 26780, 26790, 27591, or 27594

Weight: 6.5 pounds, less mounting; 7.75 pounds with 26780; 8.25 pounds with 26790; 7.25 pounds with 27591; 7.75 pounds with 27594

Dimensions: 6-3/8 inches wide, 2-11/16 inches high, 11-11/16 inches deep

Dynaverter

Specifications:

Input Voltage:	14 volt units: 13.75 volts dc 28 volt units: 27.5 volts dc
Input Current:	2.1 amperes at 13.75 volts dc 1.2 amperes at 27.5 volts dc
Output Voltages:	14 volt units: 110 volts dc; 125 volts dc; 13.4 volts, 100 cps, Ø/0°; 12.4 volts, 100 cps, Ø/180°
	28 volt units: 114 volts dc; 12.7 volts, 100 cps, Ø/0°; 14.2 volts, 100 cps, Ø/180°

Low-frequency Ripple: Less than 0.08 volt

Audio Amplifier Output: 4 watts

Transistor Complement: 2N375, 2N375 } Multivibrator Switching Circuit

* Units and accessories used for TSO certification test include Receiver; Dynaverter; 27470 or 27500 Indicator; Loop; 26790 or 26780 Mounting; 21650 Mounting; and Filter Kit 27873.

2N375, 2N375: 100 cps Push-pull Oscillator
2N375, 2N357: Push-pull Power Amplifier

Diode Complement: 1N2070, 1N2070: Full-wave Rectifier; 1N2070 Reverse Polarity Protector

Certification: FAA TSO C41a, Category B*

Mounting: 21650

Weight: 2.9 pounds; 3.5 pounds including 21650 Mounting

Dimensions: 4-1/4 inches wide, 5 inches high, 7-3/8 inches long

Indicator

Weight: 27470, 1.6 pounds; 27500, 0.8 pounds

Dimensions: 3-1/4 inches wide, 3-1/4 inches high, 6-3/4 inches deep

Loop

Weight: 4.3 pounds

Dimensions: 6-9/16 inches wide, 4 inches high, and 6-9/16 inches deep

* In addition to the Dynaverter and 21650 Mounting, units and accessories used for TSO certification test of the Cessna ADF 500 include Receiver; 27470 or 27500 Indicator; Loop; 26780 or 26790 Mounting; and Filter Kit 27873.

TABLE 4-1. UNITS

Qty	Name	Part No.
1	Receiver	25400-1000
1	Indicator**	27470
		27500
1	Loop	18000
1	Dynaverter***	26960-0014
		26960-0028
1	Mounting	26780
		26790
		27591
		27594
1	Mounting	21650
1	Loop Housing Kit	19059

** The 27500 is normally supplied for a single ADF installation; the 27470 is supplied for dual ADF installation.
*** Either a 14 volt (-0014) or a 28 volt (-0028) model of the Dynaverter may be supplied as specified.

DESCRIPTION

Receiver

The receiver is a panel-mounted, superheterodyne receiver covering the frequency range of 190 to 1750 kc in three bands. Manual band-switching and tuning are accomplished by controls located on the front of the receiver. For automatic direction finding, the receiver uses a sense antenna and a loop antenna. For conventional reception, the receiver uses a sense antenna only.

Subminiature premium-type tubes and wired-in replaceable subassemblies are used in the receiver. The tuning capacitor is a five-section, ganged, variable capacitor constructed so that its capacitance decreases with a temperature rise. This tuning capacitor, operating with fixed, temperature-compensating capacitors, assures stable operation over a wide frequency range. There is a negligible change in sensitivity and selectivity over the temperature range of -55°C (-67°F) to +71°C (+159.8°F). The i-f section, tuned to 142.5 kc, consists of three double-tuned transformers and two electron tubes. Fifteen r-f transformers are used in the r-f section, five for each frequency band. All r-f and i-f transformers are preset in inductance, filled with nitrogen, and hermetically sealed.

All controls for the ADF 500 are located on the receiver front panel. These include a tuning knob, a tuning meter, a combination on-off switch and volume control (VOL), a band selector switch (KC BAND), a function selector switch (COMP-ANT), and a compass-test switch (TEST).

The tuning knob tunes the receiver; the tuning meter provides a visual indication of the accuracy of the tuning. The VOL control is a dual potentiometer and switch combination. The switch controls and the application of the primary voltage to the ADF 500. One of the potentiometer sections is used as an audio gain control, while the other is used as an r-f sensitivity control. The KC BAND switch selects the desired tuning range by controlling the position of a six-gang wafer switch in the r-f section of the receiver.

The COMP-ANT selector switch is a two position rotary switch. When the switch is in the COMP position, both the loop and sense antennas are used and the ADF 500 functions as an automatic direction finder; also, the loop and modulating circuits of the Receiver are energized, full avc is switched in, and the VOL control regulates the audio gain. When the COMP-ANT switch is in the ANT position, only the sense antenna is used, and the receiver functions as a conventional communication and low-frequency range receiver. Under this condition, the loop and modulating circuits of the receiver do not operate and the VOL control functions as an r-f sensitivity control to eliminate the avc action. The removal of avc permits the detection of small changes in signal strength for low-frequency range navigation.

The TEST switch is a spring-loaded, double-throw,

center-off toggle switch. When the COMP-ANT switch is in the COMP position, the TEST switch is used to determine whether the radio compass indicator reading is produced by a reliable signal. With the TEST switch closed, a test voltage is applied to the loop amplifier of the receiver to drive the loop in the direction in which the switch is held (left or right). This test voltage overrides the signal circuits; when the TEST switch is held to the left or right, the loop and indicator pointer are rotated independently of the receiver signal. To check whether the indicator reading is reliable, the TEST switch is held in either position to rotate the loop antenna away from its original bearing. When the TEST switch is released, the loop antenna and indicator pointer will return to their original positions if the received signal is adequate and the indicator reading reliable. This test assures the operator the the ADF is operating properly, and that the received signal is strong enough to duplicate the indicator reading whether approached from a clockwise or counterclockwise direction. When the COMP-ANT switch is in the ANT position, the loop circuits are inoperative.

All electrical connections to the receiver are made through two cable assemblies at the rear of the unit. The sense antenna coaxial cable is connected to a fixed right-angle connector. For shock-mounting, the receiver requires a 26780 Mounting for a single-unit installation or a 26790 Mounting for a dual-unit installation. The 27591 or 27594 Mounting is used where shock-mounting is not required.

Dynaverter

The dynaverter is designed to operate from the aircraft primary d-c supply and furnish all a-c and d-c voltages for the ADF 500 System. As shown in Figure 4-2 a two-transistor multivibrator switching circuit and a full-wave diode rectifier generate the high d-c voltages. A two-transistor push-pull power oscillator generates the 100 cps a-c voltages. The filter circuit for the high-voltage d-c output is a capacitor-input filter using two chokes in series and a capacitor connected across the output.

The dynaverter requires a 21650 Mounting for installation. All input and output connections for the dynaverter and the audio amplifier are made through a 20-pin connector mounted on the front of the unit.

Indicators

The 27470 Indicator is a hermitically sealed, synchro-driven dual-pointer instrument. It is designed for mounting in a standard 3-1/8 inch cutout in an instrument panel, either from the front or the rear of the panel. The dial numerals and markings are coated with a green phosphorescent material. External connections are made through a connector at the rear of the assembly. The Indicator weighs 1.6 pounds and is 3-1/4 inches high, 3-1/4 inches wide, and 6-3/4 inches deep, overall.

The 27500 Indicator is a synchro-drive instrument, it is not hermetically sealed, and it has no provision for manual positioning of the dial (the dial is fixed at 0° heading). The dial is calibrated in 5 degree increments.

Loop

The 18000 Loop is a hermetically sealed assembly containing a loop antenna, a drive motor, a synchro

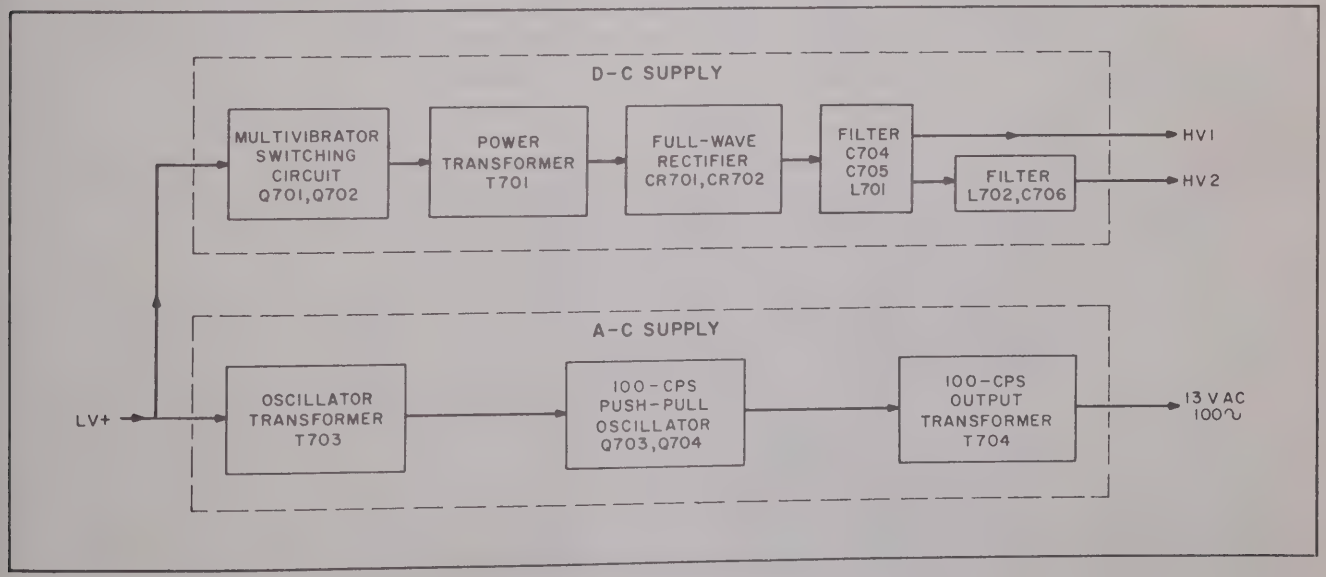


Figure 4-2. Dynaverter Block Diagram

transmitter, and an adjustable compensating device. These parts are mounted in a brass housing and covered with a glass dome. External connections are made through glass-to-metal seal connectors. The 18000 Loop weighs 4.3 pounds and is 4 inches high, 6-9/16 inches wide, and 6-9/16 inches deep.

Mountings

The 26780 Mounting and the 26790 Mounting are used to shock-mount one or two receivers, respectively. The mounting also serves as the dust cover for the receiver. The receiver is secured by wing-nuts at the rear of the mounting. The 27591 and 27594 Mountings are used for mounting one or two receivers, respectively, where shock-mounting is not required.

The 21650 Mounting is used for mounting the dynaverter. The mounting is equipped with two nut and link arrangements which engage cone-shaped studs on the dynaverter to secure the unit in place.

OVERALL FUNCTIONAL DESCRIPTION

General:

The Cessna ADF 500 provides navigation bearings on any continuous radio signal between 190 and 1750 kc. If an 27470 Indicator (movable dial) is used, the pointer on the indicator shows the relative, magnetic, or true bearing of the transmitting station with respect to the heading of the aircraft, depending on the position of the indicator dial with relation to the index. If an 27500 Indicator (fixed dial) is used, the pointer on the 27500 shows the relative bearing only. The ADF 500 also functions as a low-frequency radio range receiver and a communication receiver.

Radio Compass Operation

A simplified block diagram of the ADF 500 is shown in Figure 4-3. With the COMP-ANT switch of the receiver in the COMP position, the ADF 500 functions as follows: An r-f voltage induced in the loop by the received signal is amplified, phase-shifted 90 degrees, applied to a balanced modulator, and combined with a voltage induced in an omnidirectional sense antenna to produce a resultant amplitude-modulated signal. In this arrangement, the phase of the modulation envelope reverses with respect to the phase of the modulation source when the loop passes through a null. Because the modulation envelope is detected in a conventional manner and applied to one winding of a two-phase loop drive motor which has its other winding driven from a fixed-phase source, the direction of rotation of the loop-drive motor reverses at the null. In the ADF 500, the 100 cps modulation rate is supplied by an oscillator-amplifier in the dynaverter. The 100 cps voltages from the dynaverter oscillator-amplifier, and from the amplified detector output are used to drive the loop motor.

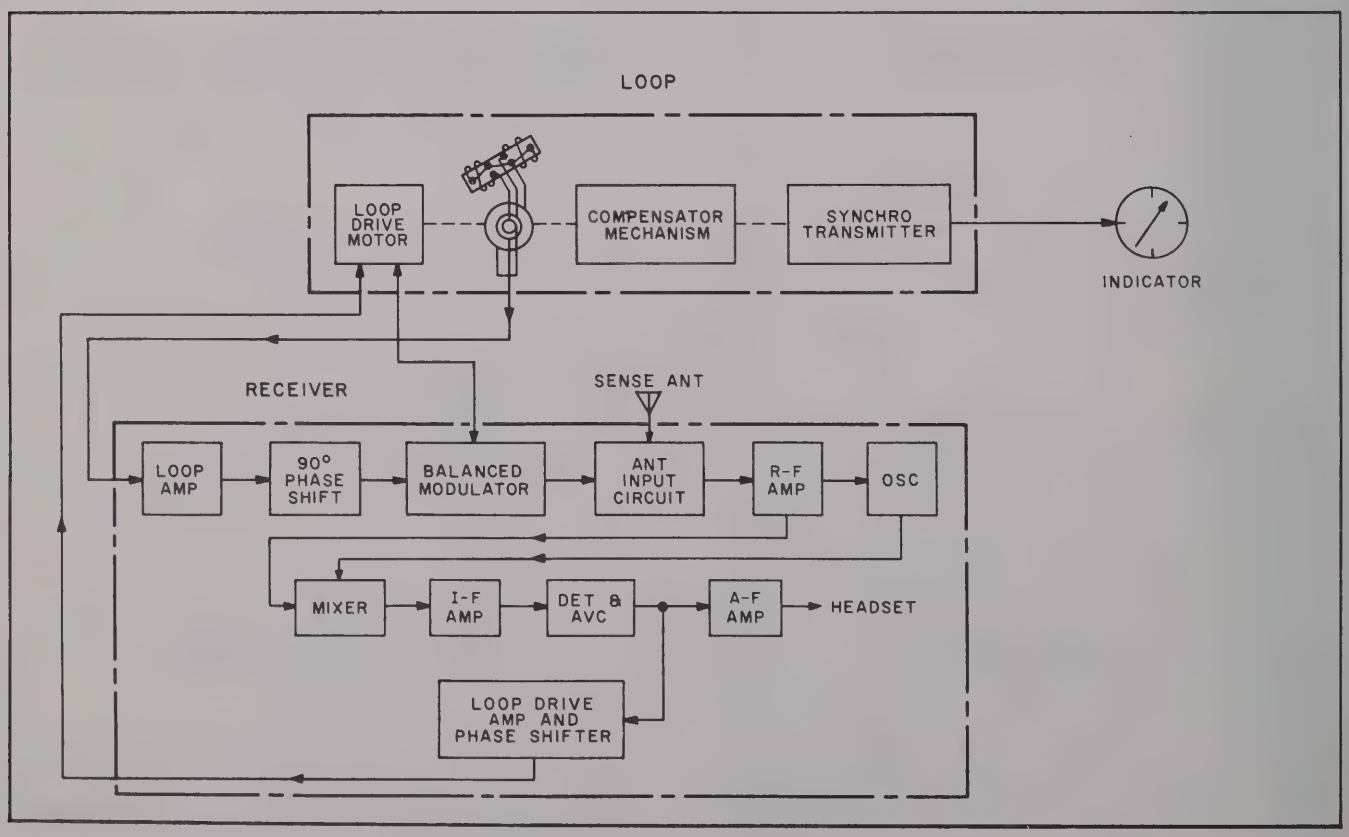


Figure 4-3. Cessna ADF 500, Block Diagram

Communication and Radio Range Operation

With the COMP-ANT switch in the ANT position, the balanced modulator is de-energized and the receiver functions as a conventional communication and low-frequency radio range receiver. The r-f voltage induced in the sense antenna is amplified and detected in the usual manner, and the audio output is fed to the headset.

Operations.

For operation of the Cessna ADF 500, refer to: CESSNA ADF 500 PILOTS MANUAL.

CESSNA ADF 500

Adjustment

LOOP COMPENSATION PROCEDURES.

Introduction.

Due to the distortion of the radio field pattern caused by propellers, engines, wings, antennas, and other structural and electrical parts of the aircraft, it is necessary that the apparent direction of arrival of the radio signal be checked every 15° with respect to the fore-and-aft axis of each particular type of aircraft. Provision is made to compensate for such errors, providing the error does not exceed ±25°. The compensating screws are located on the bottom of the loop to permit adjustment with the loop installed in the aircraft. There is no correction when the adjustment screws are set to their mid-positions.

Two methods of loop compensation are described in the following paragraphs. With the loop installed and the aircraft on the ground, one method consists of turning the aircraft to a series of predetermined headings relative to a suitable ground station and adjusting the loop compensation screws during the procedure. The location chosen for this method should be well-clear of buildings, overhead or underground conductors, or other possible reflecting objects. The results obtained in this location should be checked by selecting a second location and verifying that similar results are obtained. For maximum accuracy, compensation should be accomplished on a frequency in the band where maximum accuracy is required. In any case, ground compensation should be verified by a flight check, preferably using the same signal source as that used for ground compensation.

The other method consists of collecting error data during flight, calculating from the data the adjustments required, and setting the loop compensation screws accordingly. Two types of flight patterns suitable for collecting the error data are described.

The following precautions should be taken with regard to compensation procedures:

1. Do not attempt compensation during the period starting two hours before sunset and ending two hours after sunrise, because during this period sky waves from distant stations may introduce errors or bearing fluctuations.

2. In making flight checks or measurements, select a calm day in order to obtain accurate readings of the indicator.

3. During flight, take the radio station bearings only when the aircraft is in level flight. Avoid disturbing the directional gyro (DG) unnecessarily by making all turns uniform and gradual.

NOTE

Since the loop compensation procedure requires operation of the ADF 500, Cessna ADF 500 Pilots Manual should be reviewed before proceeding.

Loop Compensation on Ground.

Loop compensation may be performed on the ground without removing the loop from the aircraft by tuning in a radio signal transmitted from a known geographical location and turning the aircraft as required to achieve the required relative bearing. The bearing of the selected radio station relative to the heading of the aircraft must be accurately established. The angle may be determined by means of a stabilized compass system, Course Director, or by setting a transit or pelorus on top of the aircraft and sighting on a fixed object at least 1000 feet distant from the aircraft. The station selected should provide a strong, clear-channel signal, and normally should provide good, non-fluctuating bearing indications. A flight check of the compensation adjustments should be made using either one of the flight procedures described later in this section. Proceed as follows:

Step 1. Locate the aircraft in an area which is clear of buildings, overhead wires, or other possible reflecting objects.

Step 2. Turn the set on. Tune in the selected radio station, set the receiver COMP-ANT switch to COMP, and point the aircraft directly toward the station.

CAUTION

Do not force screws. In following the procedure of Steps 3, 4, 5, and 6, it may appear at first that the compensation available at a particular adjustment point is insufficient to make the indicator read correctly. If this occurs, do not force the screw in question but proceed to set the other screws. When, as required by step 8, the adjustment procedure is repeated, it will be found that sufficient compensation is available from all adjustment points.

Step 3. If an 27470 Indicator is used, turn the

VAR knob to align the dial 0° position with the index at the top of the indicator. Adjust the 0° compensation screw until the indicator pointer is at 0. (An extension cable to permit direct observation of the indicator while making this adjustment may be used.)

Step 4. Turn the aircraft 15° left, and adjust the 15° compensation screw (red scale for belly-mounted loop, black scale for top-mounted loop) to set the indicator pointer at or near 15°, which is the relative bearing to the station.

Step 5. Turn the aircraft another 30° (45° total with respect to the original aircraft position) and adjust the proper 45° compensation screw to set the indicator pointer at or near 45°.

Step 6. Continue the procedure described previously, turning the aircraft to the left to obtain each of the following relative bearings: 75°, 105°, 135°, 165°, 180°, 195°, 225°, 255°, 285°, 315°, 345°, and adjusting the proper compensation screw (red scale for belly-mounted loop, black scale for top-mounted loop) to set the indicator pointer at or near an equivalent reading.

Step 7. Repeat Steps 4, 5, and 6 as often as necessary until satisfactory compensation is achieved.

Step 8. Move the aircraft to the other selected location on the field and check that the compensation adjustments made require no change.

Step 9. Flight-check the loop compensation adjustments by following either of the procedures described in this section. In case any definite errors are noted, return to the ground location originally used. Repeat the compensation procedure, but this time make allowances for any discrepancies observed during the flight check. For example, if at the relative bearing of 45° the indicator reads 49° in the air, adjust the compensation to achieve a 41° reading on the ground when the station is at a 45° relative bearing.

Obtaining Flight Data for Loop Compensation.

General.

Two methods for obtaining the flight data required to compensate the loop, or for verifying the ground procedure used for loop compensation, are described in the following paragraphs. Unless the loop has been compensated previously, the compensation screws will be in their mid-positions (zero correction).

Method 1.

The following procedure (see Figure 4-4) requires a fairly linear ground reference landmark, such as a road or railroad tracks, directed toward a clear-channel radio station 25 to 100 miles distant. Possible distortion of the radio field may be caused by certain structures, such as power lines, steel towers, etc., on the route selected. To check whether such distortion exists, crisscross the reference line at various angles, while maintaining fixed courses by means of the DG. If rapid changes in the bearing are noted as the line is crossed, distortion exists. This distortion should be eliminated either by selecting another landmark, or by flying at a higher altitude. Proceed as follows:

Step 1. With the aircraft in level flight headed toward the radio station, fly the reference line at an altitude low enough for accurate determination of position and direction. Set the DG to 0° if the DG is not slaved. (If the aircraft has a slaved gyro, determine the heading required to produce the desired relative bearings.) If an 27470 Indicator is used, turn the VAR knob to align the dial 0° position with the index at the top of the indicator. Turn the aircraft to a 0° heading. Record the relative bearing read on the indicator on a form similar to that shown in Figure 4-5 (a completed form is shown in Figure 4-6).

Step 2. Fly a sufficient distance from the reference line so that it may be crossed at a heading of 15°. With the aircraft held in level flight on a heading of 15°, record the relative bearing read on the indicator when the reference line is crossed.

Step 3. Fly sufficiently past the reference line so that the line may be recrossed at a heading of 345° with the aircraft in level flight (see Figure 4-4). Record the indicator bearing when the aircraft crosses the reference line.

Step 4. Repeat Steps 2 and 3 for headings of 30° and 330°.

Step 5. Turn the aircraft to a heading of 180° from the radio station and check the DG reading when the heading of the aircraft coincides with the reference line. The DG reading should be within approximately 2° of a 180° heading if all maneuvers have been made properly. If precession of the DG is noted when the 180° reference line course is checked, repeat the procedure, or check the DG. Normal creeping of a free DG (2° or less over a period of 15 minutes) may be proportioned to each heading.

Step 6. With the aircraft on a 180° heading away from the radio station, follow a procedure similar to that outlined previously and obtain indicator bearings for headings of 195°, 165°, 210°, and 150° (see Figure 4-4). Then, turn the aircraft to head toward the radio station along the reference line, establishing a 0° heading with respect to the reference line.

Step 7. Continue to fly to and from the radio station, crisscrossing the reference line, as shown in Figure 4-4 until indicator bearings for every 15° change in the heading of the aircraft have been recorded. The recorded data will be used for compensating the loop.

NOTE

The procedure outlined in Steps 1 through 7 may be made over a single point, such as a radio intersection, providing the bearing to the radio station is known. Fly a series of figure eights, always crossing

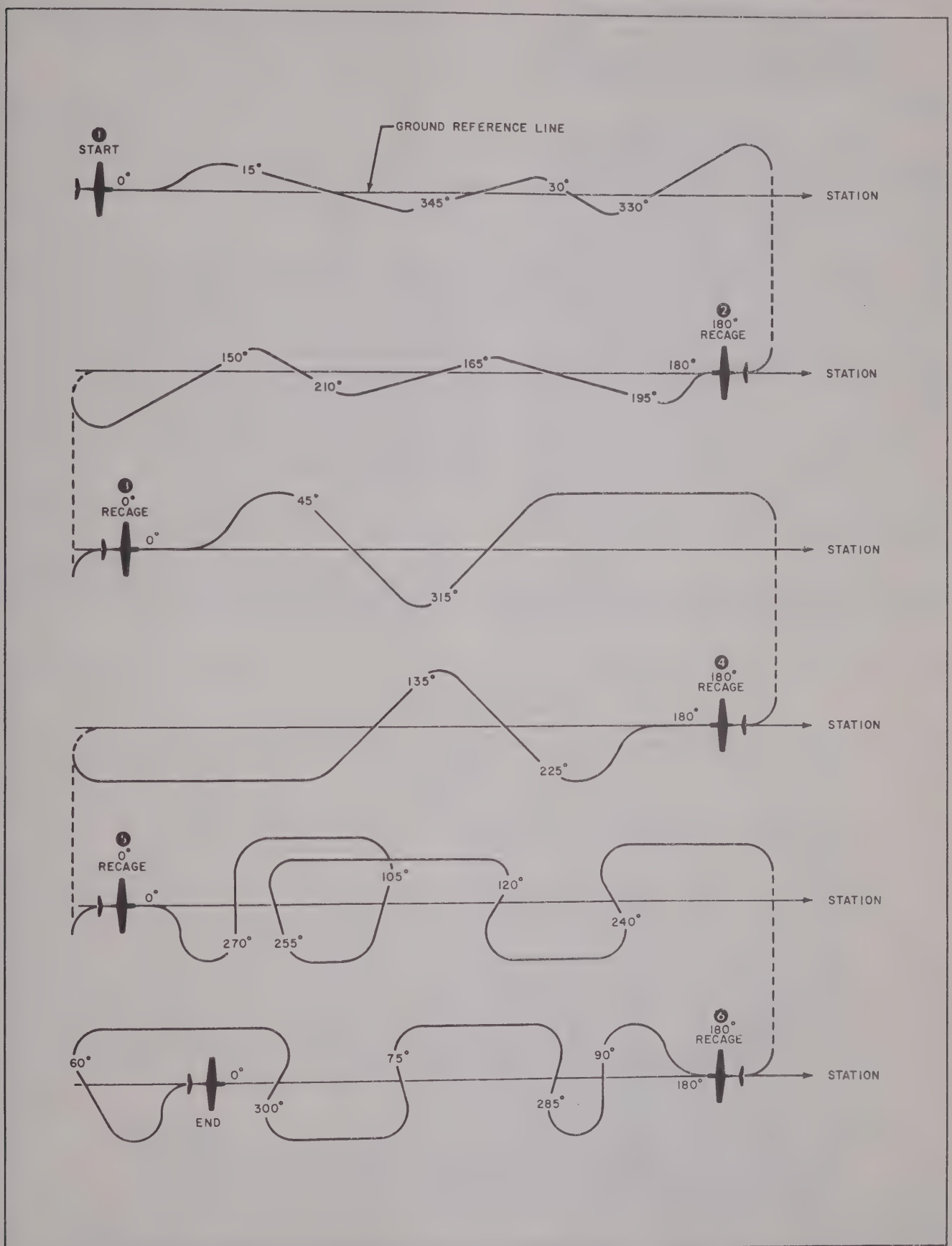


Figure 4-4. Procedure for Obtaining Flight Data for Loop Compensation, Flying Ground Reference Line

the reference point on a 15° change in heading from the previous course. Record the indicator bearing each time the aircraft crosses the reference point.

Method 2.

The following procedure requires making two 360° flight turns in opposing directions, some distance from a radio station. A landmark, such as a cross-road or a building, is used for a ground reference point from which each circle is started. Disregarding errors introduced by flight conditions or observation procedures, the accuracy of this procedure depends on the distance of the reference point from the radio station and the diameter of the two circles. The ground reference point should be as far as possible from the radio station, but still at a distance where reliable bearing indications can be obtained. The diameter of each circle should be nearly equal so that the error angles at corresponding angles of the turn circles cancel when averaged. The diameters should also be as small as possible, yet large enough so that the flying time during each chord of the circle is sufficient to permit obtaining a reliable reading. As a general recommendation, it is suggested that the distance between the ground reference point and the radio station be at least 60 miles, and that each circle have a maximum diameter of 9 miles.

Before the actual flight procedure is begun, it is necessary to correlate the 0° bearing of the indicator with the 0° heading of the aircraft. This may be done using the combined instructions of the ground-compensation procedure and Step 1 of Method 1 described previously, or in the air alone by the following method:

Step 1. Head the aircraft directly toward a radio station whose transmitting tower is clearly visible.

Step 2. Tune the receiver to the station frequency. If an 27470 Indicator is used, adjust the VAR knob to align the dial 0° position with the index at the top of the indicator.

Step 3. Using a cross-hair sight which has been aligned accurately with the fore-and-aft axis of the aircraft, align the axis of the aircraft with the station antenna tower as accurately as possible. Alternatively, if a cross-hair sight is not available, the aircraft heading and the tower may be aligned by an observer stationing himself as far aft as possible, with a clear line-of-sight through the vertical center of the windshield, and sighting along the centerline of the aircraft through the center of the windshield. Heading checks made directly from the cockpit are not reliable because parallax errors may result.

Step 4. With the aircraft held in level flight, and headed directly toward the station tower, note the indicator bearing. To confirm the reading obtained, approach the station tower from the opposite direction and check that the indicator bearing is the same. Record the indicator bearing obtained for the 0° heading of the aircraft.

FLIGHT DATA FOR LOOP COMPENSATION

Station Used _____ Frequency _____

Pilot _____ Recorder _____

Aircraft Type _____ Aircraft No. _____

FLIGHT DATA		
Column 1	Column 2	Column 3
Relative Heading	Plane-to-Station Bearing	Indicator Reading
* 0	0	
15	345	
345	15	
30	330	
330	30	
† 180	180	
195	165	
165	195	
210	150	
150	210	
* 45	315	
315	45	
† 225	135	
135	225	
* 270	90	
105	255	
255	105	
120	240	
240	120	
† 90	270	
285	75	
75	285	
300	60	
60	300	

LOOP COMPENSATION DATA	
Column 4	Column 5
Loop Azimuth Scale Reading	Corrected Indicator Reading
0	
15	
45	
75	
105	
135	
165	
180	
195	
225	
255	
285	
315	
345	

* Cage DG 0 degrees if free DG is used
† Recage DG 180 degrees if free DG is used

Figure 4-5. Form for Recording Flight Data for Loop Compensation

FLIGHT DATA FOR LOOP COMPENSATION

Station Used EWR
Pilot JONES, A.J
Aircraft Type 310

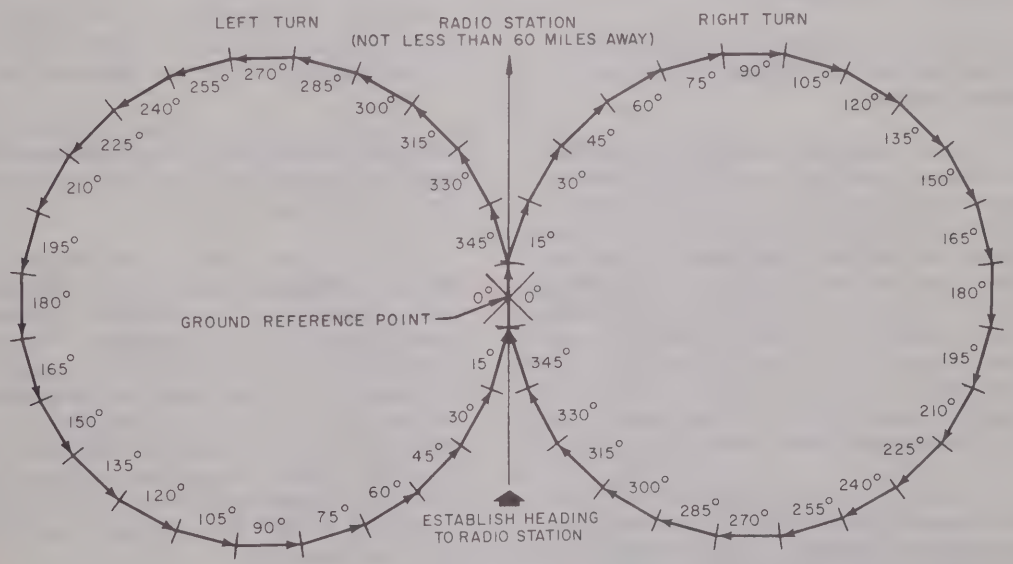
Frequency 379 KC
Recorder SMITH, E.K.
Aircraft No. N1001Q

	FLIGHT DATA		
	Column 1	Column 2	Column 3
	Relative Heading	Plane-to-Station Bearing	Indicator Reading
•	0	0	359
	15	345	350
	345	15	7
	30	330	339
	330	30	15
†	180	180	179
	195	165	169
	165	195	186
	210	150	158
	150	210	195
•	45	315	326
	315	45	26
†	225	135	146
	135	225	205
•	270	90	88
	105	255	241
	255	105	112
	120	240	220
	240	120	131
†	90	270	269
	285	75	61
	75	285	293
	300	60	41
	60	300	311

• Cage DG 0 degrees if free DG is used
† Recage DG 180 degrees if free DG is used

LOOP COMPENSATION DATA	
Column 4	Column 5
Loop Azimuth Scale Reading	Corrected Indicator Reading
0	1
15	30
45	63
75	83
105	100
135	123
165	159
180	181
195	210
225	243
255	263
285	279
315	303
345	337

Figure 4-6. Example of Recorded Flight Data for Loop Compensation



PROCEDURE:
1. ESTABLISH HEADING.
2. READ INDICATOR BEARING.
3. CHANGE DG HEADING 15 DEGREES AND REPEAT. (ALLOW EQUIVALENT TIME FOR EACH HEADING SO THAT DIAMETERS OF TURNS ARE EQUAL.)

Figure 4-7. Procedure for Obtaining Flight Data for Loop Compensation, Flying Two 360-Degree Turns

With the 0° indicator bearing and the 0° aircraft heading correlated, the flight procedure may be performed (see Figure 4-7). The principle of this procedure is to obtain indicator readings for every 15° change in heading during each of the 360° turns. To approximate a circle as closely as possible, the flying time and speed of each 15° course should be very nearly equal. After each turn has been completed, an indicator reading relative to a given DG reading will be obtained for each turn. The indicator readings are averaged and the result is used for loop compensation. Proceed as follows:

Step 1. Select a ground reference point which is not less than 60 miles from the radio station to be used. Approach the reference point so that it is between the aircraft and the station. Orient the aircraft for a 0° bearing on the indicator. If the previous flight procedure has established that the 0° heading of the aircraft does not coincide with the 0° bearing of the station within ±2°, fly the aircraft on the heading that corresponds to the 0° bearing obtained in the preliminary flight procedure.

Step 2. With the aircraft held in steady, level flight directly toward the station, set the DG to 0°. (If a slaving DG is installed in the aircraft, determine the proper heading.) Maintain the heading, and when the plane is over the ground reference point, record the indicator bearing.

Step 3. Turn the aircraft smoothly and evenly to the right for a heading of 15°. With the aircraft leveled out on this heading for not more than 25 seconds, note and record the indicator bearing on a form similar to that shown in Figure 4-5.

Step 4. Turn the aircraft to a heading of 30°. After level flight has been reassumed, note and record the indicator bearing.

Step 5. Follow a similar procedure as outlined previously in Steps 3 and 4 for each 15° increase in heading of the aircraft, until the circle-turn is completed. Record the indicator bearings for each heading. If the turn has been executed properly, the aircraft should be over the reference point at the end of the last 15° turn. Turn the aircraft for a 0° indicator bearing. The aircraft should now be headed directly toward the radio station in line with the original starting line. Check the relative bearing for this heading; the reading should agree with its original setting within 2° to 3° if all turns have been made properly.

Step 6. With the aircraft over the ground reference point and headed directly toward the station, as shown by the indicator reading, check that the DG reading agrees with its original setting. If not, make a 0° reference check, as outlined in Steps 1 and 2 of this procedure.

Step 7. Start the second 360° turn by turning the aircraft to the left for a 345° heading. When the aircraft is in steady, level flight on this heading, record the indicator bearing.

Step 8. Continue the circle turn, until completed, decreasing the heading in 15° intervals. Keep the diameter of this left turn as equivalent as possible to the right turn made previously. Record the indicator bearing for each 15° change in heading.

Step 9. Average the right-turn and left-turn indicator bearings for each corresponding DG heading. The recorded averages will be used for compensating the loop.

Preparation of Compensation Data Curve.

After the in-flight compensation data has been recorded, the data may be plotted and the resulting curve used for determining the loop compensation adjustments. Proceed as follows:

Step 1. Using Figure 4-8, plot the indicator bearing (column 3) against the corresponding plane-to-station bearing (column 2). An example of a resultant curve is shown in Figure 4-9.

Step 2. Lay a straight edge parallel to the sloping dotted line and through the data point of column 3 on the vertical scale, and draw a fine line (see Figure 4-9). The point at which this line intersects the solid line is the plot point. (The example shown in Figure 4-9 indicates that for an actual bearing of 15°, the indicator bearing is 7°.)

Step 3. Repeat Step 2 for each of the remaining 15° positions.

Step 4. Connect the plotted points to form the compensation data curve.

Step 5. Determine the corrected indicator bearing values for column 5 of Figure 4-5 (see Figure 4-6 for example) from the resulting curve as follows:

a. Draw fine lines parallel to the solid lines at the intersections of the plotted curve and the dotted lines corresponding to the degree values given in column 4 (see Figure 4-9).

b. In column 5, record the values for the points of intersection as read on the vertical graduations beside the 15° dotted line values in column 4 (see Figure 4-9). For example: To determine the corrected indicator bearing for a loop position of 45° (column 4), lay the straight edge parallel to the solid line and draw a fine line through the intersection of the dotted 45° line and the curve (see Figure 4-9). This line passes through the vertical graduations at 63°. This value is recorded in column 5. Similarly, a bearing of 105° from column 4 gives a bearing of 100° for column 5.

Adjustment of Loop Compensation Screws.

CAUTION

Do not force screws. In the following procedure, it may appear at first that the compensation available at a particular point is insufficient to make the indicator read correctly. If this oc-

curs, do not force the screw in question but proceed to set the other screws. When, as required by Step 6, the adjustment procedure is repeated, it will be found that sufficient compensation is available from all adjustment points.

Adjustment of the loop compensation screws may be made with the loop installed on the aircraft; or if desirable, the loop may be removed from the aircraft and installed in a bench test setup using the ARC Type BTK-21 Bench Test Kit. Using the data in columns 4 and 5 of Figure 4-5, proceed as follows:

Step 1. Determine which group of compensation screws is to be used; the red scale is for belly-mounted loops, the black scale for top-mounted loops.

Step 2. Turn on the equipment. (Do not run the engines.) Set the receiver COMP-ANT switch to the COMP position and set the VOL control at minimum.

Step 3. With the TEST switch held to the left or right, rotate the loop until the loop hairline is at 0°; stop the loop at 0° by quickly setting the COMP-ANT switch to ANT. Turn the 0° adjustment screw until the indicator reads the computed value in column 5 of Figure 4-6.

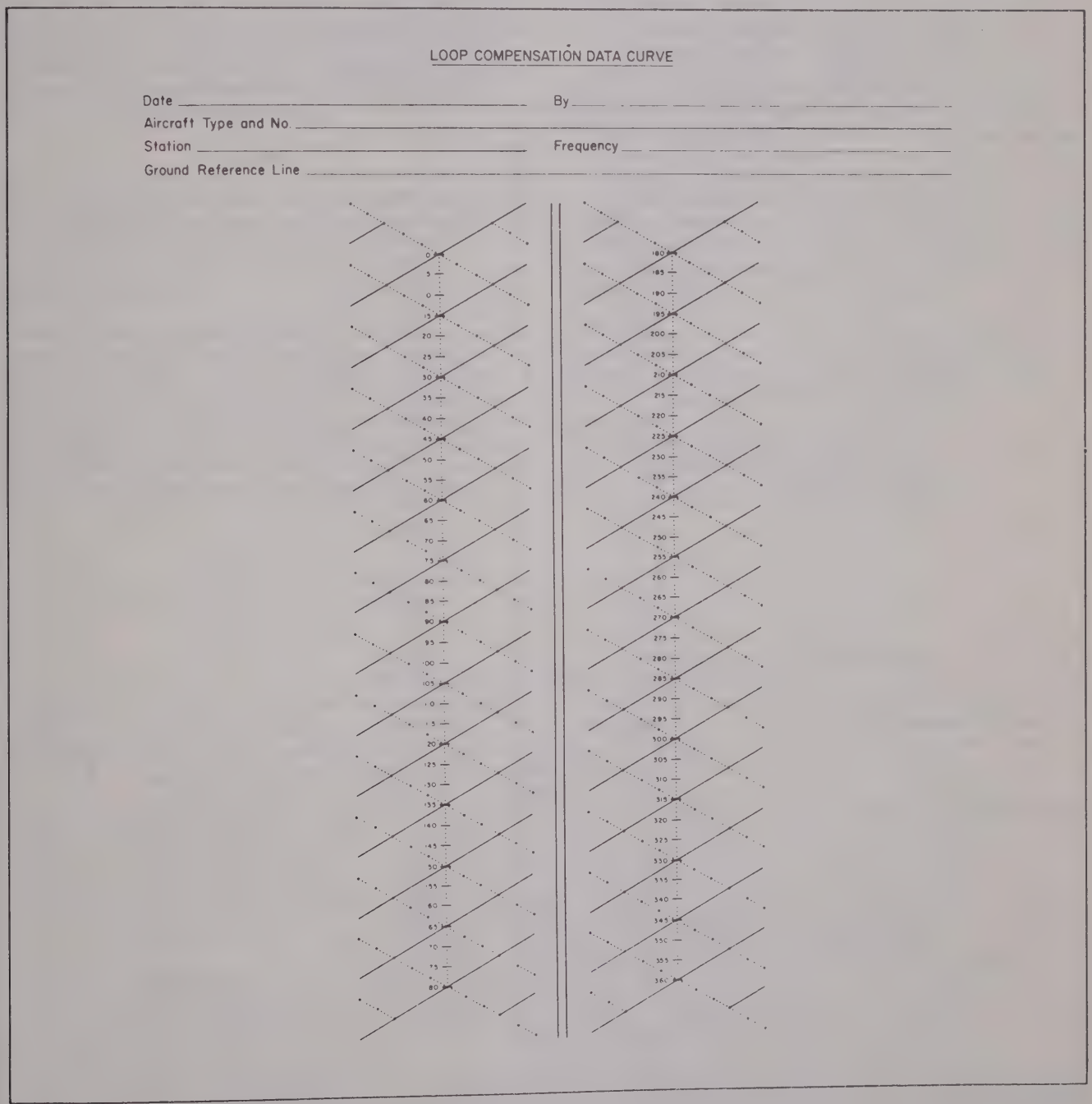


Figure 4-8. Form for Plotting Loop Compensation Data Curve

NOTE

The COMP-ANT switch is set to ANT to prevent any further movement of the loop.

Step 4. Set the COMP-ANT switch to COMP, and using the procedure given in Step 3, rotate the loop to 15°. Adjust the proper 15° adjustment screw until the indicator reads the corresponding computed value of column 5.

Step 5. Continue the adjustments for each of the settings listed in column 4 of Figure 4-5, adjusting the proper compensation screw for each setting.

Step 6. Repeat these adjustments, and those of Steps 3 and 4, until satisfactory compensation has been achieved.

Step 7. Ground- and flight-test the equipment before installing the loop housing, in case additional adjustments may be required.

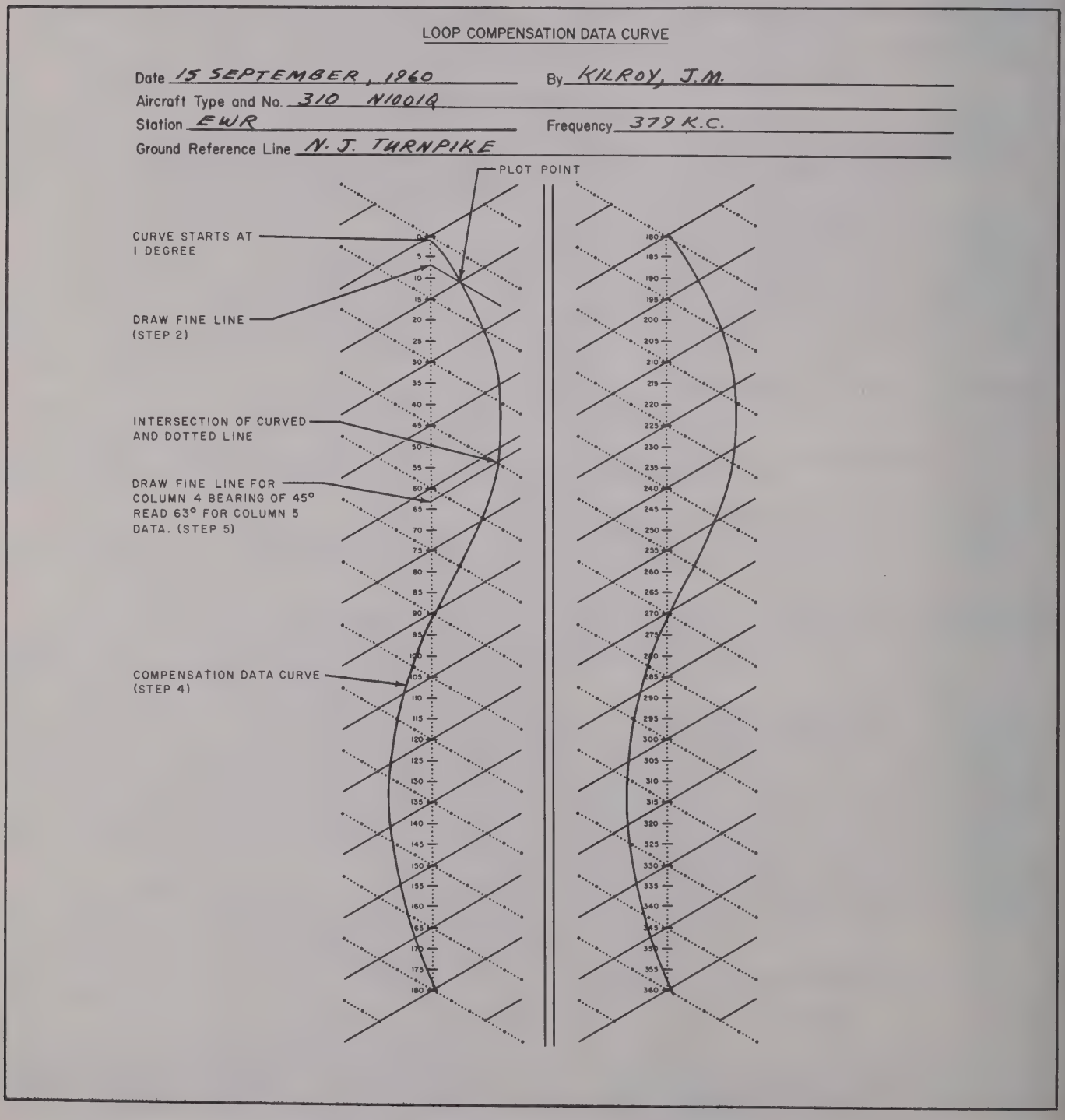

LOOP COMPENSATION DATA CURVE
Date 15 SEPTEMBER, 1960
By KILROY, J.M.
Aircraft Type and No. 310 N1001Q
Station EWR
Frequency 379 K.C.
Ground Reference Line N. J. TURNPIKE
PLOT POINT
CURVE STARTS AT 1 DEGREE
DRAW FINE LINE (STEP 2)
INTERSECTION OF CURVED AND DOTTED LINE
DRAW FINE LINE FOR COLUMN 4 BEARING OF 45° READ 63° FOR COLUMN 5 DATA. (STEP 5)
COMPENSATION DATA CURVE (STEP 4)

Figure 4-9. Example of Loop Compensation Curve

CESSNA ADF 500

Maintenance

INTRODUCTION.

The following contains maintenance information for the Cessna ADF 500. Included is a list of test equipment required for maintenance, system performance tests, alignment and adjustment information, and individual maintenance procedures for each of the major units. Schematic and wiring diagrams for the units are included in this section.

WARNING

Voltages in the units of the ADF 500 are dangerous and may be fatal if contacted, observe all safety precautions.

TEST EQUIPMENT.

Table 4-2 lists the test equipment required for maintenance of the ADF 500; equivalent test equipment may be substituted. Use of the BTK-21 Bench Test Kit with Cable Assembly 28050 is recommended to facilitate maintenance procedures. If a BTK-21 is not available, either r-f Field Simulator 19780 and Loop Cable Coupler 19760 (which are part of the BTK-21) or a calibrated screen room is required.

If a calibrated screen* room is used, provision must be made for the sense antenna input to the receiver. For this purpose, an r-f capacitive line divider must be connected between the signal generator, which directly energizes the screen room radiating wire, and the sense antenna cable of the ADF 500. This line divider must have an attenuation of 4:1 for 1/4-meter effective height times the screen room field attenuation factor** and, in addition, must have an output capacitance of 50$\mu\mu$f. An r-f line divider for a screen room and a table listing the capacitor values for several room factors are shown in Figure 4-10. The addition of a 50$\mu\mu$f dummy antenna capacitor and a DP DT switch as a DUMMY-FIELD selector switch provides a convenient method of selecting either the microvolts or microvolts-per-meter field strength signal input for the receiver.

*The construction and calibration of a suitable screen room is described in RTCA Paper 83-56/DO-70, RTCA Secretariat, 16 and Constitutional Avenue N. W., Washington 25, D. C.

**Screen Room Attenuation Factor =

$$\frac{\text{Signal Generator Output } (\mu v)}{\text{Field Strength } (\mu v/\text{meter})}$$

TABLE 4-2. TEST EQUIPMENT

Qty	Name	Description	Characteristics
1	Automatic Direction Finder	Cessna ADF 500	———
1	Bench Test Kit	BTK-21	———
1	Cable Assembly	28050	As shown in Figure 4-42
1	Cable Harness*	———	———
1	Crystal Calibrator	Measurements Model 111-B	
1	Dummy Antenna*	———	50$\mu\mu$f capacitor
1	Loop Cable Coupler*	19760	———
1	Power Supply	Electro Products Model NF	0-28 volts dc 10 amperes minimum
1	Resistor	———	300 ohms, 1/2 watt
1	RF Field Simulator*	19780	———
1	Screen Room*	———	———
1	Signal Generator	Measurements Model 65-B	———
1	Stopwatch	———	———
1	Vacuum Tube Voltmeter	Ballantine Model 300	———
1	Vacuum Tube Voltmeter*	Hewlett-Packard Model 410B	———

* Necessary only if a BTK-21 is not available.

SYSTEM PERFORMANCE TESTS.

General.

Table 4-3 outlines the procedures for checking the performance of the ADF 500. The individual tests may be performed separately if desired: However, if the receiver has been realigned, all tests must be performed. Unless otherwise noted, all controls, jacks, and indicators referred to in the table are located on the ADF Test Panel 19770 (supplied with BTK-21). The test equipment required for performing the tests is listed in Table 4-2. Figure 4-11 illustrates the bench test setup using a BTK-21 Bench Test Kit. The bench test setup without the BTK-21 is shown in Figure 4-12.

Test Conditions.

Unless otherwise specified, the following test conditions apply when using either bench test setup.

Signal Source.

The output of the signal generator is connected either to the SIG GEN receptacle on the RF Field Simulator of the BTK-21 or to the input receptacle of the r-f line divider. When the DUMMY-FIELD switch of the RF Field Simulator or r-f line divider is in the DUMMY position, the signal generator is fed through a 50$\mu\mu$f capacitor to the 100$\mu\mu$f sense antenna cable. In the FIELD position, the signal generator is coupled to the sense antenna cable to provide 1/4-meter antenna effective height and also to feed a wire radiator which supplies the signal source for the loop. The FIELD position of the RF Field Simulator also provides direct conversion of signal generator microvolts to microvolts/meter field strength, but the microvolt output of the signal generator must be divided by the "room factor" to obtain the microvolts/meter field strength at the antenna input to the receiver; however, in the DUMMY position, the microvolt output of the signal generator is used directly.

S+N/N Ratio.

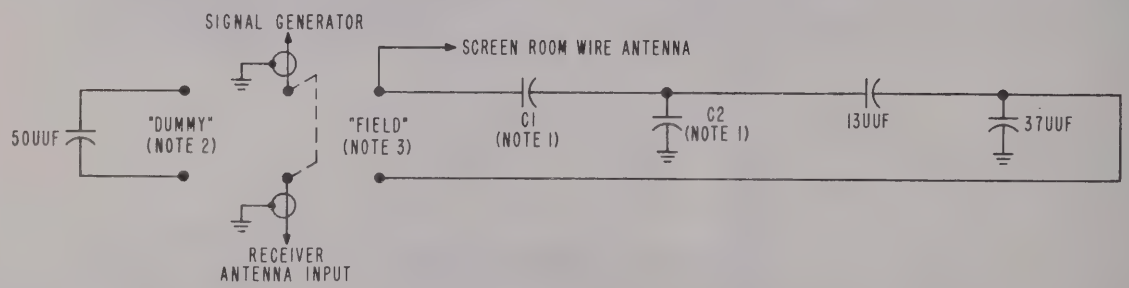
All S+N/N ratios are made to produce a 6 db or 10 db S+N/N ratio at 50 mw S+N into a 300 ohm load. The correct reference points for the 6 db ratio is 3.88 volts (50 mw) S+N and 1.94 volts (12.5 mw) N. The 10 db ratio is 3.88 volts (50 mw) S+N and 1.22 volts (5.0 mw) N.

Audio Output.

A 300 ohm resistor must be connected directly across the input terminals of the Ballantine Model 300 voltmeter, or equivalent. Headset or similar equipment connected in parallel with the input of the voltmeter must have a very high impedance, or else be disconnected, in order not to affect the audio output measurements.

Modulation.

The modulation required is 30 per cent at 1000 cps.



NOTES:

1. TO DETERMINE VALUE OF C1 AND C2 (IN $\mu\mu$F) FOR ANY ROOM FACTOR, USE THE FOLLOWING FORMULA:

$$\text{ROOM FACTOR} = \frac{C1 + C2}{C1}$$

FOR KNOWN ATTENUATION RATIOS, THE FOLLOWING CHART MAY BE USED.

ROOM FACTOR	10:1	9:1	8:1	7:1	6:1	5:1	4:1	3:1
C1 ($\mu\mu$F)	100	100	100	100	100	100	100	100
C2 ($\mu\mu$F)	900	800	700	600	500	400	300	200

2. IN "DUMMY" POSITION, THE SIGNAL GENERATOR INDICATES THE ANTENNA OPEN-CIRCUIT MICROVOLTS DIRECTLY.
3. IN "FIELD" POSITION, THE SIGNAL GENERATOR OUTPUT DIVIDED BY THE ROOM FACTOR IS EQUAL TO MICROVOLTS/METER FIELD STRENGTH.

Figure 4-10. Capacitive Line Divider for Screen Room

TABLE 4-3. SYSTEM PERFORMANCE CHECKS

Step	Procedure With BTK-21	Procedure Without BTK-21	Normal Indications
	PRELIMINARY PROCEDURE		
1	Interconnect ADF 500 and test equipment as shown in Figure 4-11. (Unconnected test equipment shown in the illustration is to be connected when so directed in this procedure.)	Interconnect ADF 500 and test equipment as shown in Figure 4-12. (Unconnected test equipment shown in the illustration is to be connected when so directed in this procedure.)	None.
2	Apply power to units by turning Receiver VOL control clockwise. Adjust output of primary power supply to 13.75 or 27.5 volts dc depending on voltage rating of equipment. Allow Receiver to warm up for at least 30 minutes.	Same as with BTK-21.	None.
3	Prepare the Measurements Model 65-B Signal Generator for operation.	Same as with BTK-21.	None.
	HIGH-VOLTAGE TEST		
1	Perform Steps 1 and 2 of the preliminary procedure outlined in this table.	Same as with BTK-21.	None.
2	Set meter switch to LV and Receiver COMP-ANT switch to COMP.	Set COMP-ANT switch to COMP. Remove bottom cover of Dynaverter. Connect Hewlett-Packard Model 410B vtvm between terminal I of J301 and ground.	None.
3	Set meter switch to HV1.	Connect vtvm between terminal J of J301 and ground.	Meter reads between 135 and 150 volts dc.
4	Set meter switch to HV2.	Connect vtvm between terminal K of J301 and ground.	Meter reads between 115 and 125 volts dc.
	MINIMUM NOISE LEVEL		
1	Perform Steps 1 and 2 of the preliminary procedure outlined in this table.	Same as with BTK-21.	None.
2	Connect Ballantine Model 300 vtvm, with 300-ohm resistor across input, to either TEL jack.	Connect Ballantine Model 300 vtvm, with 300-ohm resistor across input, between terminal 5 of J103 and ground.	None.
3	Set meter switch to TEL JKS, Receiver COMP-ANT switch to ANT, and Receiver VOL control fully counterclockwise (minimum) position.	Set COMP-ANT switch to ANT and VOL control fully counterclockwise (minimum) position.	Meter reads less than 400 mv (equivalent to .005 mw).
	MCW (ANT) SENSITIVITY[1]		
1	Perform the preliminary procedure outlined in this table.	Same as with BTK-21.	None.
2	Connect Ballantine Model 300 vtvm, with 300-ohm resistor across input, to either TEL jack. If desired, a high-impedance headset may be connected in parallel with the voltmeter.	Connect Ballantine Model 300 vtvm, with 300-ohm resistor across input, between terminal 5 of J103 and ground.	None.
3	Set meter switch to TEL JKS, DUMMY-FIELD switch to DUMMY, Receiver COMP-ANT switch to ANT, and Receiver KC BAND switch to 190-400.	Set COMP-ANT switch to ANT, KC BAND switch to 190-400 and DUMMY-FIELD switch to DUMMY.	None.
4	Tune Receiver to 380 kc.	Same as with BTK-21.	None.

[1] MCW ANT sensitivity is defined as the signal input level, modulated 30 per cent at 1000 cps, fed in series with a 50-$\mu\mu$f capacitance to the 100-$\mu\mu$f sense antenna cable, required to produce a 6-db S+N/N ratio at 50 mw S+N (modulation on, modulation off; 50 mw is equal to 3.88 volts across 300 ohms).

TABLE 4-3. SYSTEM PERFORMANCE CHECKS - Continued

Step	Procedure With BTK-21	Procedure Without BTK-21	Normal Indications
	MCW (ANT) SENSITIVITY - Continued		
5	Set Measurements Model 65-B Signal Generator output to 10 μv, modulated 30 per cent, 1000 cps.	Same as with BTK-21.	None.
6	Tune signal generator in vicinity of 380 kc for maximum audio output as indicated on vtvm. Adjust Receiver VOL control to produce 3.88 volts output.	Same as with BTK-21.	None.
7	Turn modulation off and read voltmeter.	Same as with BTK-21.	If output is more than 6 db below 3.88 volts (less than 1.94 volts) sensitivity is better than 10 μv.
8	Set KC BAND switch, and tune Receiver and Model 65-B to frequencies specified. Repeat Steps 5, 6, and 7. KC BAND / Receiver / Model 65-B 400-840 / 800 / 800 840-1750 / 1650 / 1650 190-400 / 300 / 300 400-840 / 620 / 620 840-1750 / 1300 / 1300 190-400 / 210 / 210 400-840 / 450 / 450 840-1750 / 950 / 950	Same as with BTK-21.	As noted in Step 7.
	COMPASS SENSITIVITY		
1	Perform the preliminary procedure outlined in this table.	Same as with BTK-21.	None.
2	Set Receiver KC BAND switch to 190-400 and tune Receiver to 210 kc.	Same as with BTK-21.	None.
3	Set Receiver COMP-ANT switch to ANT, LOOP MOTOR switch ON and DUMMY-FIELD switch to FIELD.	Set COMP-ANT switch to COMP and DUMMY-FIELD switch to FIELD.	None.
4	Set Measurements Model 65-B Signal Generator output to 10,000 μv (10,000 μv/meter field strength), with no modulation.	Same as with BTK-21.	None.
5	Tune signal generator in vicinity of 210 kc for maximum tuning meter deflection.	Same as with BTK-21.	Loop nulls.
6	Rotate indicator VAR. knob until pointer is at dial 0° position.	If an 27470 Indicator is used, rotate VAR knob until pointer is at dial 0° position.	If loop is compensated, dial 0° position and pointer may not align with indicator index.
7	Set signal generator output to 60 μv (60μv/meter signal strength) with no modulation and tune signal generator in vicinity of 210 kc for maximum tuning meter deflection.	Same as with BTK-21.	Indicator reads 0° ±2° with ±2° jitter.
8	Set signal generator output to 10,000 μv. Note average reading of indicator pointer jitter.	Same as with BTK-21.	Indicator reads 0° ±1° with ±1/2° jitter.
9	Set signal generator output to 60 μv. Press Receiver LOOP switch to rotate loop 175° clockwise from null. Release LOOP switch and note time (in seconds) required for loop to return within 2° of null.	Same as with BTK-21.	Loop returns in 9 seconds or less. If loop has been compensated, indicator may slow down, speed up, or both, while loop is traveling toward zero, which is normal. To check that loop mechanism is not defective, press LOOP switch to see that loop rotates smoothly when slewed away from null.

TABLE 4-3. SYSTEM PERFORMANCE CHECKS - Continued

Step	Procedure With BTK-21	Procedure Without BTK-21	Normal Indications
	COMPASS SENSITIVITY - Continued		
10	Set Receiver KC BAND switch to 400-840 and tune Receiver to 450 kc. Repeat Steps 7, 8, and 9, except tune signal generator in vicinity of 450 kc.	Same as with BTK-21.	As noted in Steps 7, 8, and 9.
11	Set Receiver KC BAND switch to 840-1750 and tune Receiver to 950 kc. Repeat Steps 7, 8, and 9, except tune signal generator in vicinity of 950 kc.	Same as with BTK-21.	As noted in Steps 7, 8, and 9.
12	Set Receiver KC BAND switch to 190-400 and tune Receiver to 380 kc. Repeat Steps 7, 8, and 9, except tune signal generator in vicinity of 380 kc.	Same as with BTK-21.	As noted in Steps 7, 8, and 9.
13	Set Receiver KC BAND switch to 400-840. Do not change tuning of Receiver. Repeat Steps 7, 8, and 9, except tune signal generator in vicinity of 800 kc.	Same as with BTK-21.	As noted in Steps 7, 8, and 9.
14	Set Receiver KC BAND switch to 840-1750 and tune Receiver to 1650 kc. Repeat Steps 7, 8, and 9, except tune signal generator in vicinity of 1650 kc.	Same as with BTK-21.	As noted in Steps 7, 8, and 9.
	SELECTIVITY		
1	Perform the preliminary procedure outlined in this table.	Same as with BTK-21.	None.
2	Connect Ballantine Model 300 vtvm, with 300-ohm resistor across input, to either TEL jack. Set meter switch to TEL JKS.	Connect Ballantine Model 300 vtvm, with 300-ohm resistor across input, between terminal 5 of J103 and ground.	None.
3	Set DUMMY-FIELD switch to DUMMY, Receiver KC BAND switch to 840-1750 and Receiver COMP-ANT switch to ANT.	Same as with BTK-21.	None.
4	Tune Receiver to 1700 kc.	Same as with BTK-21.	None.
5	Set Measurements Model 65-B Signal Generator output to 50 μv, modulated 30 per cent, 1000 cps.	Same as with BTK-21.	None.
6	Tune signal generator in vicinity of 1700 kc for maximum audio output as indicated on vtvm. Adjust Receiver VOL control to produce 3.88 volts output.	Same as with BTK-21.	None.
7	Increase signal generator output to 100 μv. Set signal generator frequency above resonance to the point where the output (as read on the vtvm) equals 3.88 volts. Record this frequency. Repeat the procedure below resonance and record this frequency.	Same as with BTK-21.	Difference between the two frequencies (6 db bandwidth) is between 8.0 and 10.0 kc.
8	Increase signal generator output to 50,000 μv and repeat Step 7.	Same as with BTK-21.	Difference between the two frequencies (60 db bandwidth) is between 29 and 34 kc.
9	Set Receiver KC BAND switch to 190-400. Tune Receiver to 210 kc.	Same as with BTK-21.	None.
10	Repeat Steps 5 and 6 except tune the signal generator in vicinity of 210 kc.	Same as with BTK-21.	None.
11	Repeat Step 7.	Same as with BTK-21.	Difference between the two frequencies (6 db bandwidth) is between 6.6 and 8.2 kc.
12	Increase signal generator output to 50,000 μv and repeat Step 7.	Same as with BTK-21.	Difference between the two frequencies (60 db bandwidth) is between 18.2 and 22.2 kc.

TABLE 4-3. SYSTEM PERFORMANCE CHECKS - Continued

Step	Procedure With BTK-21	Procedure Without BTK-21	Normal Indications
	AVC TEST		
1	Perform the preliminary procedure outlined in this table.	Same as with BTK-21.	None.
2	Connect Ballantine Model 300 vtvm, with 300-ohm resistor across input, to either TEL jack.	Connect Ballantine Model 300 vtvm, with 300-ohm resistor across input, between terminal 5 of J103 and ground.	None.
3	Set Receiver KC BAND switch to 190-400 and tune Receiver to 210 kc.	Same as with BTK-21.	None.
4	Set R-318A COMP-ANT switch to COMP and DUMMY-FIELD switch to DUMMY.	Same as with BTK-21.	None.
5	Set Measurements Model 65-B Signal Generator output to 100 μv modulated 30 per cent at 1000 cps. Tune signal generator in vicinity of 210 kc for maximum tuning meter deflection. Adjust Receiver VOL control to produce 3.88 volts output as indicated on the vtvm.	Same as with BTK-21.	None.
6	Set signal generator output to 10 μv.	Same as with BTK-21.	Voltmeter reads between 2.5 and 4.5 volts.
7	Set signal generator output to 100 μv.	Same as with BTK-21.	Voltmeter reads between 3.82 and 3.94 volts.
8	Set signal generator output to 100,000 μv.	Same as with BTK-21.	Voltmeter reads between 4.5 and 6.5 volts.
9	Set signal generator output to 500,000 μv.	Same as with BTK-21.	Voltmeter reads less than 8.0 volts.
10	Set Receiver KC BAND switch to 400-840 and tune Receiver to 450 kc. Repeat Steps 2 through 9,	Same as with BTK-21.	As noted in Steps 2 through 9.
11	Set Receiver KC BAND switch to 840-1750 and tune Receiver to 950 kc. Repeat Steps 2 through 9.	Same as with BTK-21.	As noted in Steps 2 through 9 except that at 10 μv voltmeter reads between 1.8 and 3.0 volts and at 100,000 μv, voltmeter reads between 5.0 and 7.0 volts.
	POWER OUTPUT TEST		
1	Perform the preliminary procedure outlined in this table.	Same as with BTK-21.	None.
2	Connect Ballantine Model 300 vtvm, with 300-ohm resistor across input, to either TEL jack.	Connect Ballantine Model 300 vtvm, with 300-ohm resistor across input, between terminal 5 of J103 and ground.	None.
3	Set Receiver KC BAND switch to 840-1750 and tune Receiver to 950 kc. Set Receiver COMP-ANT switch to COMP, DUMMY-FIELD switch to DUMMY, and meter switch to TEL JKS.	Same as with BTK-21.	None.
4	Set Measurements Model 65-B Signal Generator output to 100 μv modulated 30 per cent at 1000 cps. Tune signal generator in vicinity of maximum tuning meter deflection.	Same as with BTK-21.	None.
5	Set Receiver VOL control to extreme clockwise position and note audio output as indicated on vtvm.	Same as with BTK-21.	Voltmeter reads between 10 and 15 volts

TABLE 4-3. SYSTEM PERFORMANCE CHECKS - Continued

Step	Procedure With BTK-21	Procedure Without BTK-21	Normal Indications
	LOW-VOLTAGE OPERATIONAL TEST		
1	Perform the preliminary procedure outlined in this table.	Same as with BTK-21.	None.
2	Connect Ballantine Model 300 vtvm, with 300-ohm resistor across input, to either TEL jack.	Connect Ballantine Model 300 vtvm, with 300-ohm resistor across input, between terminal 5 of J103 and ground.	None.
3	Set Receiver KC BAND switch to 190-400 and tune DUMMY-FIELD switch to DUMMY. Adjust primary voltage to 11.0 volts dc (for 14 volt units) or 22.0 volts dc (for 28 volt units). Set meter switch to TEL JKS.	Same as with BTK-21.	None.
5	Set Measurements Model 65-B Signal Generator output to 10 μv modulated 30 per cent at 1000 cps. Tune signal generator in vicinity of 210 kc for maximum audio output as indicated on vtvm. Adjust Receiver VOL control to produce 2.0 volts.	Same as with BTK-21.	None.
6	Turn modulation off and read voltmeter.	Same as with BTK-21.	Voltmeter reads 1.0 volt, or less.
7	Set Receiver KC BAND switch to 400-840 and tune Receiver to 450 kc.	Same as with BTK-21.	None.
8	Repeat Steps 5 and 6 except tune signal generator in vicinity of 450 kc.	Same as with BTK-21.	As noted in Step 6.
9	Set Receiver KC BAND switch to 840-1750 and tune Receiver to 950 kc.	Same as with BTK-21.	None.
10	Repeat Steps 5 and 6 except tune signal generator in vicinity of 950 kc.	Same as with BTK-21.	As noted in Step 6.

)TES:

1. PARTS MARKED WITH AN ASTERISK (*) ARE NOT PART OF BENCK TEST KIT BTK-21.

2. BTK-21 CONSISTS OF:

19770	ADF TEST PANEL
19760	LOOP COUPLER ASSEMBLY
19780	RF FIELD SIMULATOR
17985	LOOP ANTENNA CABLE ASSEMBLY
17984	SENSE ANTENNA CABLE ASSEMBLY

The BTK-21 MAY BE PURCHASED COMPLETE OR BY SEPARATE PARTS. THE LOOP COUPLER ASSEMBLY AND RF FIELD SIMULATOR ARE ALSO USED TO TEST THE CESSNA ADF 300.

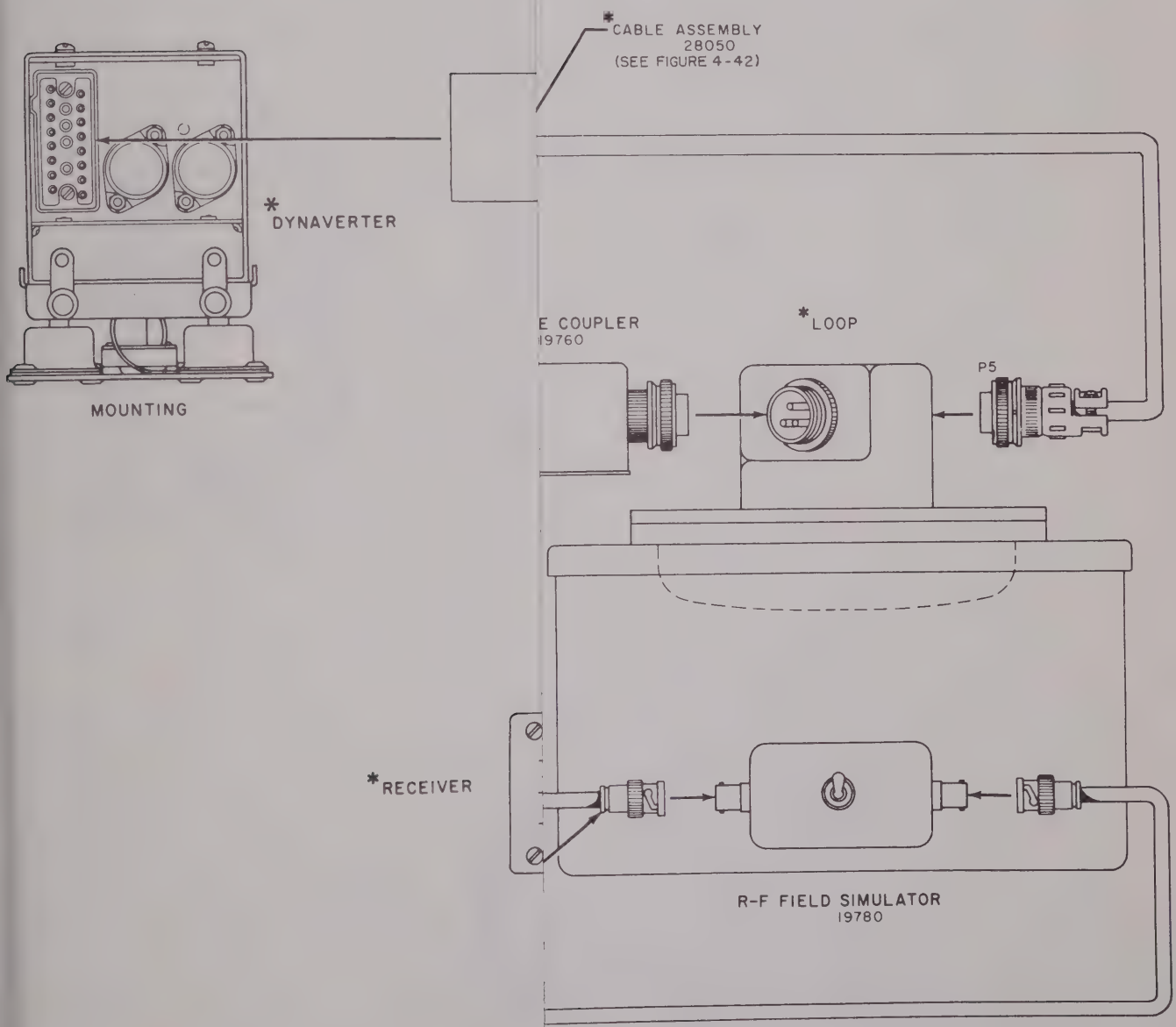
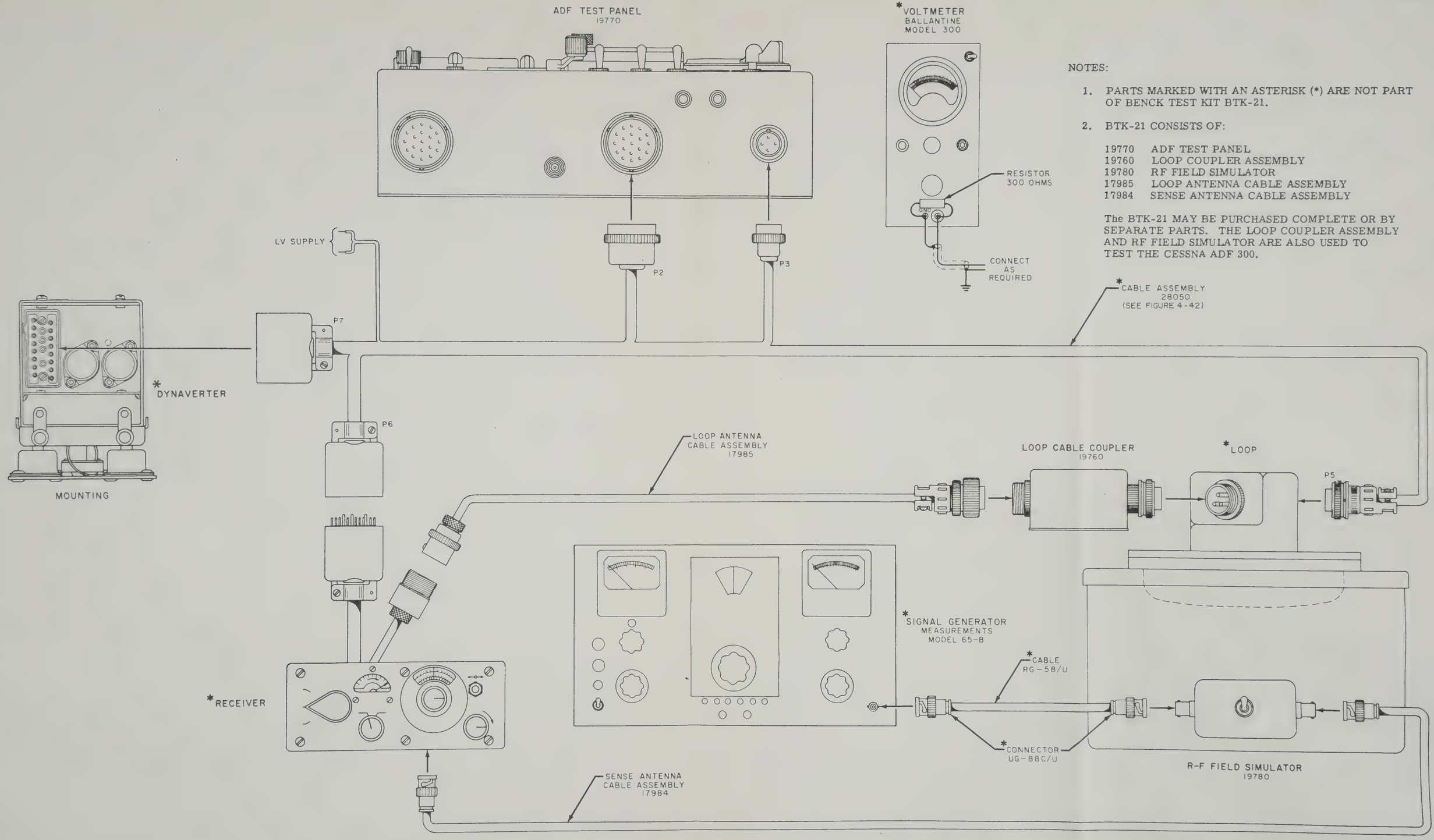


Figure 4-11. Bench Test Interconnection Diagram with BTK-21 Bench Test Kit



NOTES:

1. PARTS MARKED WITH AN ASTERISK (*) ARE NOT PART OF BENCK TEST KIT BTK-21.

2. BTK-21 CONSISTS OF:

19770	ADF TEST PANEL
19760	LOOP COUPLER ASSEMBLY
19780	RF FIELD SIMULATOR
17985	LOOP ANTENNA CABLE ASSEMBLY
17984	SENSE ANTENNA CABLE ASSEMBLY

The BTK-21 MAY BE PURCHASED COMPLETE OR BY SEPARATE PARTS. THE LOOP COUPLER ASSEMBLY AND RF FIELD SIMULATOR ARE ALSO USED TO TEST THE CESSNA ADF 300.

Figure 4-11. Bench Test Interconnection Diagram with BTK-21 Bench Test Kit

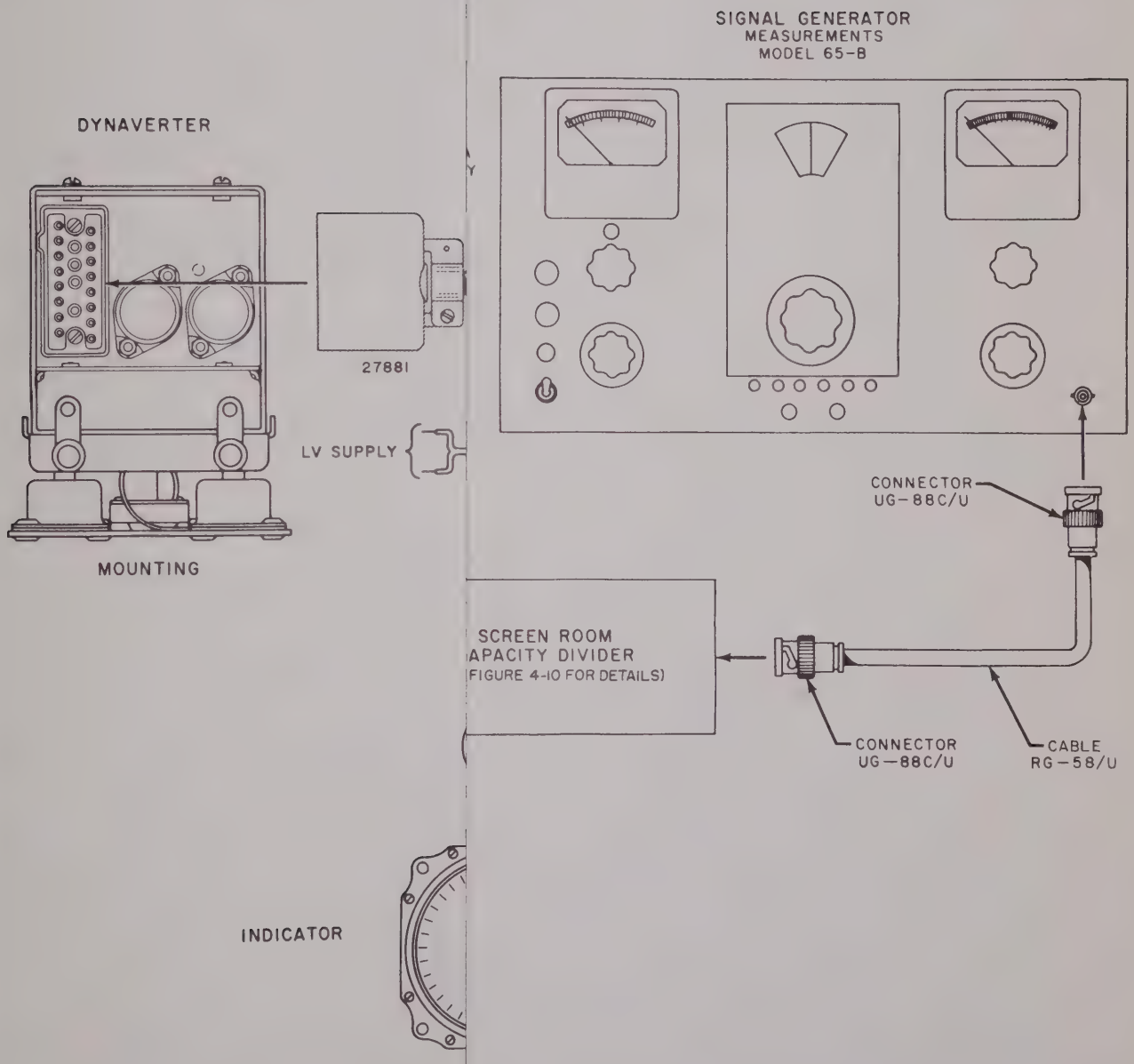


Figure 4-12. Bench Test Interconnection Diagram without BTK-21 Bench Test Kit

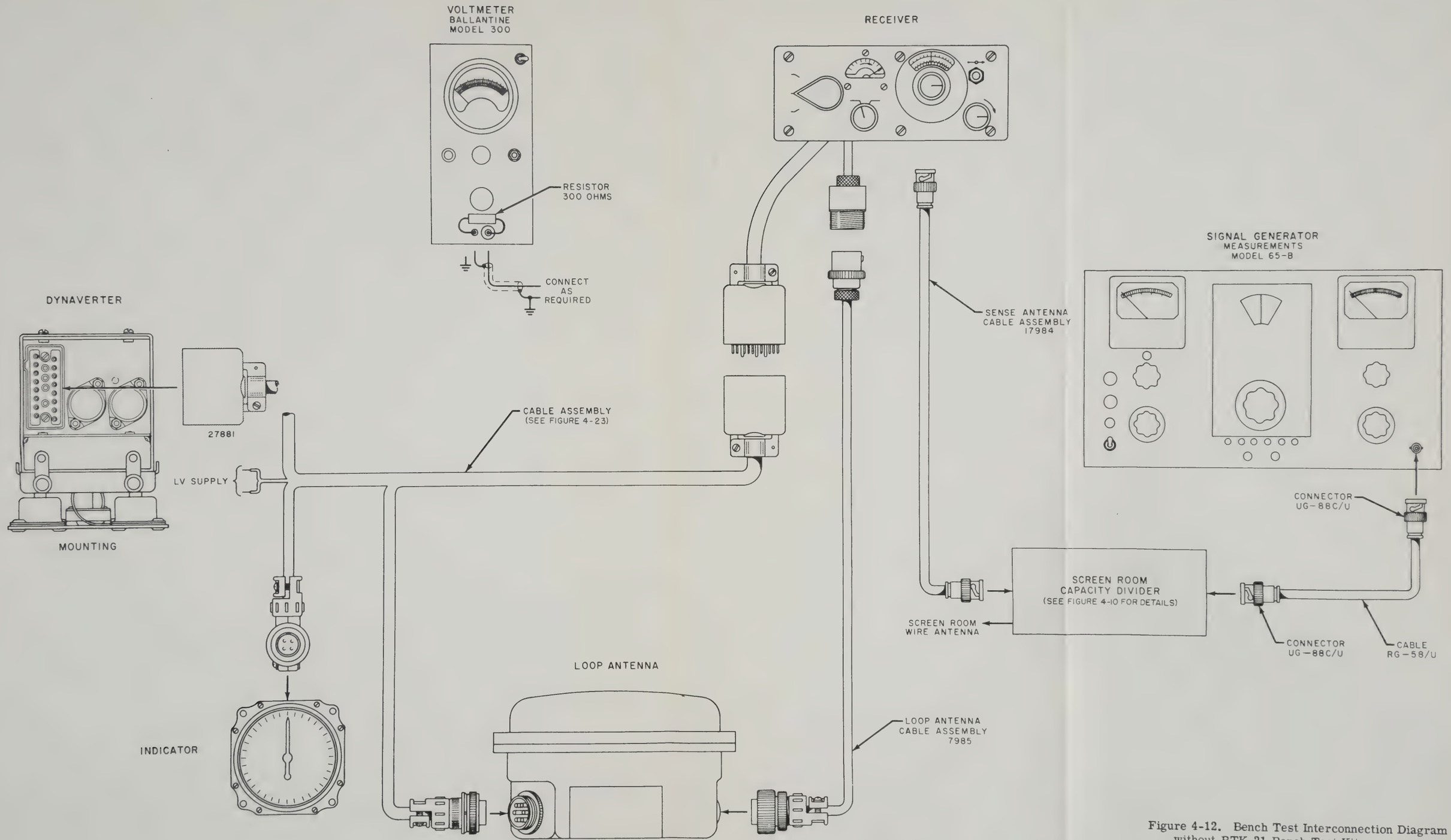


Figure 4-12. Bench Test Interconnection Diagram without BTK-21 Bench Test Kit

ALIGNMENT AND ADJUSTMENT.

Table 4-4 outlines the procedure for aligning the receiver. Though the specific alignment procedures are identified by subtitles, they should not be performed individually; each procedure presupposes that all previous steps have been completed. The test equipment required for alignment and adjustment of the receiver is listed in Table 4-2. The bench test setup using a BTK-21 Bench Test Kit is shown in Figure 4-11. The bench test setup without a BTK-21 is shown in Figure 4-12. The alignment points referred to in the Table are shown in Figure 4-13. The standard test conditions described are applicable. Unless otherwise noted, all controls and indicators referred to in the table are located on the ADF Test Panel 19770 (supplied with the BTK-21).

NOTE

The receiver is aligned at the factory. Do not realign unless it is evident that such action is required. If the receiver is realigned, all the test procedures of Table 4-3 must be performed to check the accuracy of alignment.

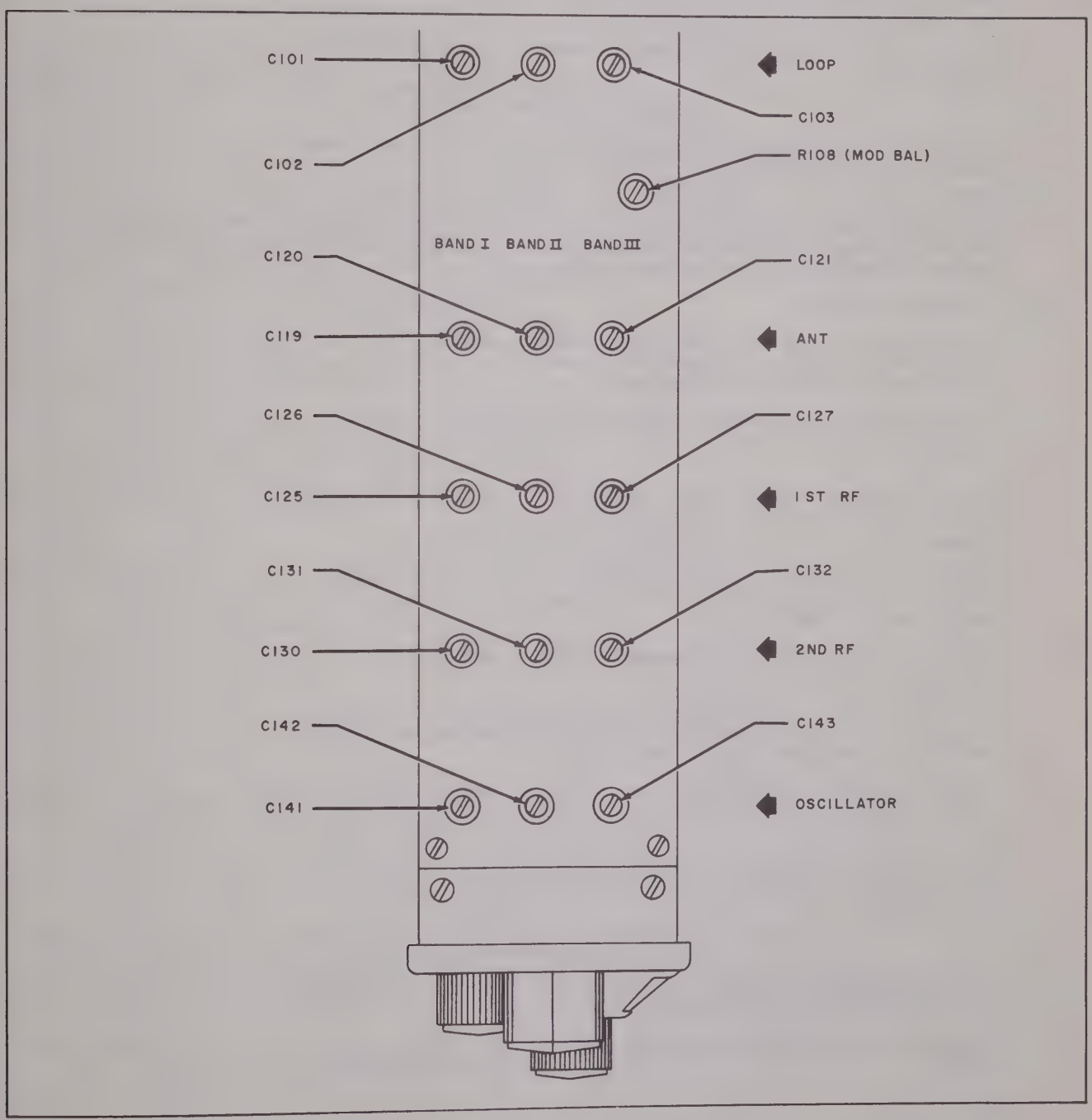


Figure 4-13. Receiver, Alignment Points

TABLE 4-4. ADJUSTMENT AND ALIGNMENT

Step	Procedure With BTK-21	Procedure Without BTK-21
	PRELIMINARY PROCEDURE	
1	Interconnect ADF 500 and test equipment as shown in Figure 4-11. (Unconnected test equipment shown in the illustration is to be connected when so directed in this procedure.)	Interconnect ADF 500 and test equipment as shown in Figure 4-12. (Unconnected test equipment shown in the illustration is to be connected when so directed in this procedure.)
2	Apply power to units by turning Receiver VOL control clockwise. Adjust output of primary power supply to 13.75 or 27.5 volts dc, depending on voltage rating of equipment. Allow Receiver to warm up for at least 30 minutes.	Same as with BTK-21.
3	Prepare Measurements Model 65-B Signal Generator for operation.	Same as with BTK-21.
	TRIMMER CAPACITOR ALIGNMENT	
4	Set signal generator output to exactly 380 kc. Use Measurements Model 111-B Crystal Calibrator to check frequency.	Same as with BTK-21.
5	Set Receiver COMP-ANT switch to COMP, Receiver KC BAND switch to 190-400, LOOP MOTOR ON-OFF switch OFF and DUMMY-FIELD switch to FIELD.	Set COMP-ANT switch to COMP, KC BAND switch to 190-400 and DUMMY-FIELD switch to FIELD.
6	Tune Receiver to 380 kc.	Same as with BTK-21.
7	Set signal generator output to approximately 10,000 μv. Adjust in order: C141, C130, C125, and C119 for maximum deflection of the Receiver tuning meter.	Same as with BTK-21.
8	Set signal generator output to 20 μv. Readjust in order: C141, C130, C125, and C119 for maximum deflection of tuning meter.	Same as with BTK-21.
9	Set signal generator to exactly 800 kc. Set Receiver KC BAND switch to 400-840. Do not change tuning of Receiver.	Same as with BTK-21.
10	Set signal generator output to approximately 10,000 μv. Adjust in order: C142, C131, C126, and C120 for maximum deflection of tuning meter.	Same as with BTK-21.
11	Set signal generator output to 20 μv. Readjust in order: C142, C131, C126, and C120 for maximum deflection of tuning meter.	Same as with BTK-21.
12	Set signal generator to 1650 kc. Set Receiver KC BAND switch to 840-1750. Tune Receiver to 1650 kc.	Same as with BTK-21.
13	Set signal generator output to 10,000 μv. Adjust in order: C143, C132, C127, and C121 for maximum deflection of tuning meter.	Same as with BTK-21.
14	Set signal generator output to 20 μv. Readjust in order: C143, C132, C127, and C121 for maximum deflection of tuning meter.	Same as with BTK-21.
	LOOP AMPLIFIER ALIGNMENT	
15	Set Receiver COMP-ANT switch to COMP and Receiver KC BAND switch to 190-400.	Same as with BTK-21.
16	Rotate indicator VAR. knob until pointer is at dial 0° position.	If an 27470 Indicator is used, rotate indicator VAR knob until pointer is at dial 0° position.

TABLE 4-4. ADJUSTMENT AND ALIGNMENT - Continued

Step	Procedure With BTK-21	Procedure Without BTK-21
	LOOP AMPLIFIER ALIGNMENT - Continued	
17	Set DUMMY-FIELD switch to FIELD. Set LOOP MOTOR switch ON, press LOOP switch to rotate loop either 10° or 350° as read on the indicator. Quickly release LOOP switch and set LOOP MOTOR switch OFF. Note It is necessary to set the LOOP MOTOR switch OFF quickly to prevent the loop from returning to the 0° (null) position.	Set DUMMY-FIELD switch to FIELD. Press LOOP switch to rotate loop to either 10° or 350° as read on indicator. Quickly release LOOP switch and disconnect the power cable connected to the loop. Note It is necessary to disconnect loop power cable quickly to prevent loop from returning to 0° (null) position.
18	Set signal generator to exactly 380 kc.	Same as with BTK-21.
19	Set signal generator output to 10,000 μv with no modulation.	Same as with BTK-21.
20	Tune Receiver to 380 kc.	Same as with BTK-21.
21	Set test panel to TEL 300 w. Adjust Receiver VOL control to provide a 0.5 volt reading on the meter.	Adjust Receiver VOL control to provide a 0.5 volt reading on the Ballantine Model 300 Voltmeter.
22	Adjust trimmer C101 for maximum output on the meter. If the output exceeds 10.0 volts, decrease the Receiver VOL control setting to prevent overloading.	Same as with BTK-21.
23	Set signal generator to 800 kc. Set Receiver KC BAND switch to 400-840. Do not change tuning of Receiver. Adjust Receiver VOL control to provide a 0.5 volt reading on the meter. Adjust C102 for maximum output.	Same as with BTK-21.
24	Set signal generator to exactly 1650 kc. Set Receiver KC BAND switch to 840-1750. Tune Receiver to exactly 1650 kc. Adjust Receiver VOL control to provide a 0.5 volt reading on the meter. Adjust C103 for maximum output.	Same as with BTK-21.
	BALANCED MODULATOR ADJUSTMENT	
25	Set Receiver KC BAND switch to 190-400. Tune Receiver to 380 kc. Make certain no signal is being received; detune slightly if necessary.	Same as with BTK-21.
26	Set Receiver COMP-ANT switch to COMP and LOOP MOTOR switch ON.	Set Receiver COMP-ANT switch to COMP.
27	With no signal generator output, adjust the Receiver MOD BAL potentiometer R108 for minimum rotational speed of loop.	Same as with BTK-21.
28	Set Receiver KC BAND switch to 400-840 (do not change tuning of Receiver) and note speed of loop rotation. Set Receiver KC BAND switch to 840-1750 and tune Receiver to 1650 kc. Note speed of loop rotation. Make certain no signal is being received in either band position, detune slightly if necessary.	Same as with BTK-21.
29	Reset Receiver MOD BAL potentiometer R108 for (minimum rotation) on all bands. Under no-signal conditions, loop should not rotate faster than 180° in 30 seconds on any band.	Same as with BTK-21.

MAINTENANCE OF RECEIVER.

General.

Except for some parts and the r-f assemblies, the tubes and most other electrical parts in the receiver can be replaced without disassembly. The wiring diagrams included in this section will aid in locating and identifying the parts by their schematic reference designations. After a part has been replaced, the operation of the equipment should be rechecked. If any parts are replaced in the r-f assemblies, the receiver should be tested and realigned as described in Tables 4-3 and 4-4, respectively.

Replacement of Parts in i-f/a-f Circuits.

The parts of the i-f/a-f circuits are mounted on the right side wall and on the bottom printed-circuit board of the receiver. To expose these parts, remove the three screws fastening the bottom printed-circuit board and fold the board outward.

Replacement of Tubes.

All tubes in the receiver are subminiature types. These tubes use flexible leads which are soldered directly to a terminal point. When replacing a tube, the new tube should be oriented and its leads routed as nearly like the original as possible. Figure 4-16 is a tube location diagram. Tube wiring diagrams showing proper orientation and lead routing are shown in Figures 4-17 through 4-21. When replacing a tube, do not precut the leads before installation, keep the spacing between leads at least 1/16 inch, and use a minimum amount of solder.

Removal of r-f Assemblies.

To remove any of the r-f assemblies proceed as follows:

Step 1. Remove the receiver from its mounting rack. Set the tuning control knob counterclockwise to the stop and the KC BAND switch to 840-1750.

Step 2. Remove the ten flat head screws from the left side of the chassis and then lift the detached plate from the chassis.

Step 3. Loosen the setscrews and then remove the control knobs from the front panel.

Step 4. Detach the retaining nuts from the VOL control, COMP-ANT switch, and TEST switch. Remove the six binding head screws attaching the front panel to the receiver chassis. Carefully displace the front panel and its wiring to expose the band switch detent and shaft assembly.

Step 5. Remove the two binding head screws and spacers that hold the band selector switch shaft in position. Extract the band switch detent and shaft assembly from the chassis.

Step 6. Unsolder all green leads that interconnect the defective r-f assembly and the tuning capacitor. Unsolder all other wires interconnecting the defective r-f assembly and other assemblies at the most convenient location.

Step 7. Detach the defective r-f assembly from the r-f assemblies adjacent to it. Depending on the location of the defective r-f assembly, either two or four screws and attached hardware may have to be removed.

Step 8. Remove the two screws attaching the defective r-f assembly to the center partition plate. With the receiver in its normal position, the two screws are located on the right side of the center partition plate adjacent to the tuning capacitor. To obtain access to the screws, it may be necessary to displace the tuning capacitor. To displace the capacitor, remove the four screws attaching it to the main chassis.

Step 9. With the bottom of the receiver up, remove the two screws and attaching hardware used to hold the defective r-f assembly to the center partition plate. These screws are located beneath the cable assembly adjacent to the main printed-circuit board.

Step 10. Lift the defective r-f assembly from the receiver.

Replacement of r-f Assemblies.

To replace any of the r-f assemblies, reverse the procedure outlined previously for removal. Observe the following precautions: Carefully inspect the front and rear wafer switch contacts before replacing the band switch detent and shaft assembly in the receiver. Before engaging the long switch shaft in any switch rotor, be sure that the rotor is not oriented 180° from its proper position. All switch rotor notches in the r-f assemblies should be on the same side of the flatted shaft, with all notches viewed from the front of the receiver.

If an r-f assembly has been installed with the rotor improperly oriented, it is not necessary to remove it for realignment of the rotor. Push the shaft through the properly aligned rotors, turn the shaft by rotating the entire band switch assembly until the previously engaged rotors agree with the one that is improperly oriented, engage this rotor, and return the shaft to the original angle to engage the remaining rotors.

Voltage and Resistance Measurements.

Tube pin voltage and resistance measurements for the receiver are shown in Figure 4-22.

MAINTENANCE OF DYNAVERTER.

Introduction.

Since the dynaverter has no moving parts, periodic maintenance is not necessary. Follow the procedures outlined in Table 4-6 to isolate the cause of abnormal operation.

WARNING

Voltages in this equipment are dangerous and may be fatal if contacted. Observe all safety precautions.

Test Equipment.

In addition to the test equipment specified in Table 4-2, the test equipment, or equivalent, listed in Table 4-5 is required to test the dynaverter. Individual voltmeters and ammeters listed in the table are necessary only if a permanent bench testing facility for the dynaverter is to be established. Otherwise, these meters may be replaced by conventional multirange test equipment having the capabilities specified.

Performance and Trouble Analysis.

Table 4-6 outlines the procedures for checking dynaverter voltages, dynaverter currents, a-c operating frequencies, and performance of the optional audio amplifier. The bench test circuit for performing the procedures is shown in Figure 4-14. All meters and switches referred to in the procedures are located in the bench test circuit. Schematic and wiring diagrams for the dynaverter are shown in Figures 4-15 and 4-24.

In addition to the tests outlined in Table 4-6, the dynaverter should be checked for operating performance with the other units of the ADF 500 system. The system performance check may be accomplished by performing the "System Performance Checks" in Table 4-3.

TABLE 4-5. TEST EQUIPMENT

Equipment	Model or Type	Use in Circuit
Ammeter (A1)	0 - 10 amperes dc	Input current
Audio Oscillator	Hewlett-Packard Model 200AB	Checking audio amplifier frequency
Capacitor (C1)	4 μf, 200 vdcw	d-c blocking capacitor
Capacitor (C2)	0.5 μf, 600 vdcw	d-c blocking capacitor
Frequency Meter (M1)	94 - 116 cps, 10 - 15 volts ac, reed type	a-c output frequency
Inductor (L1)*	65 mh, rated for 100 cps, 11 -15 volts ac	a-c load reactor
Loudspeaker	8 ohms impedance	Monitoring audio output
Milliammeter (A2)	0 150 ma dc	HV1 current
Milliammeter (A3)	0 - 30 ma dc	HV2 current
Multimeter	Simpson Model 260	Continuity and resistance measurements
Primary Power Source	Electro Products Laboratory, Model NF, 0 - 30 volts dc, 0 - 10 amperes	Primary power
Resistor (R1)	22 ohms ±0.5 ohm, 20 watts	a-c load resistor
Resistor (R2)	1800 ohms ±5%, 20 watts	HV1 load resistor
Resistor (R3)	5000 ohms ±5%, 10 watts	HV2 load resistor
Switch (S1)	Single-pole single-throw	Power on-off
Switch (S2)	Single-pole double-throw	HV voltmeter switch
Switch (S3)	Single-pole double-throw	a-c voltmeter switch
Switch (S4)	Single-pole double-throw	100 cps plate voltmeter switch
Voltmeter (V1)	0 - 30 volts dc	Input voltage
Voltmeter (V2)	0 - 150 volts dc	High voltage
Voltmeter (V3)	0 - 20 volts ac, rectifier type	a-c voltage
Voltmeter (V4)	0 - 30 volts ac, rectifier type	100 cps plate voltage
Voltmeter (V5)	0 - 5 volts ac, rectifier type	Ripple voltage
Voltmeter (V6)	0 - 5 volts ac, 20,000 ohms-per-volt	Audio oscillator output measurement

* A 18190 Choke Coil may be used.

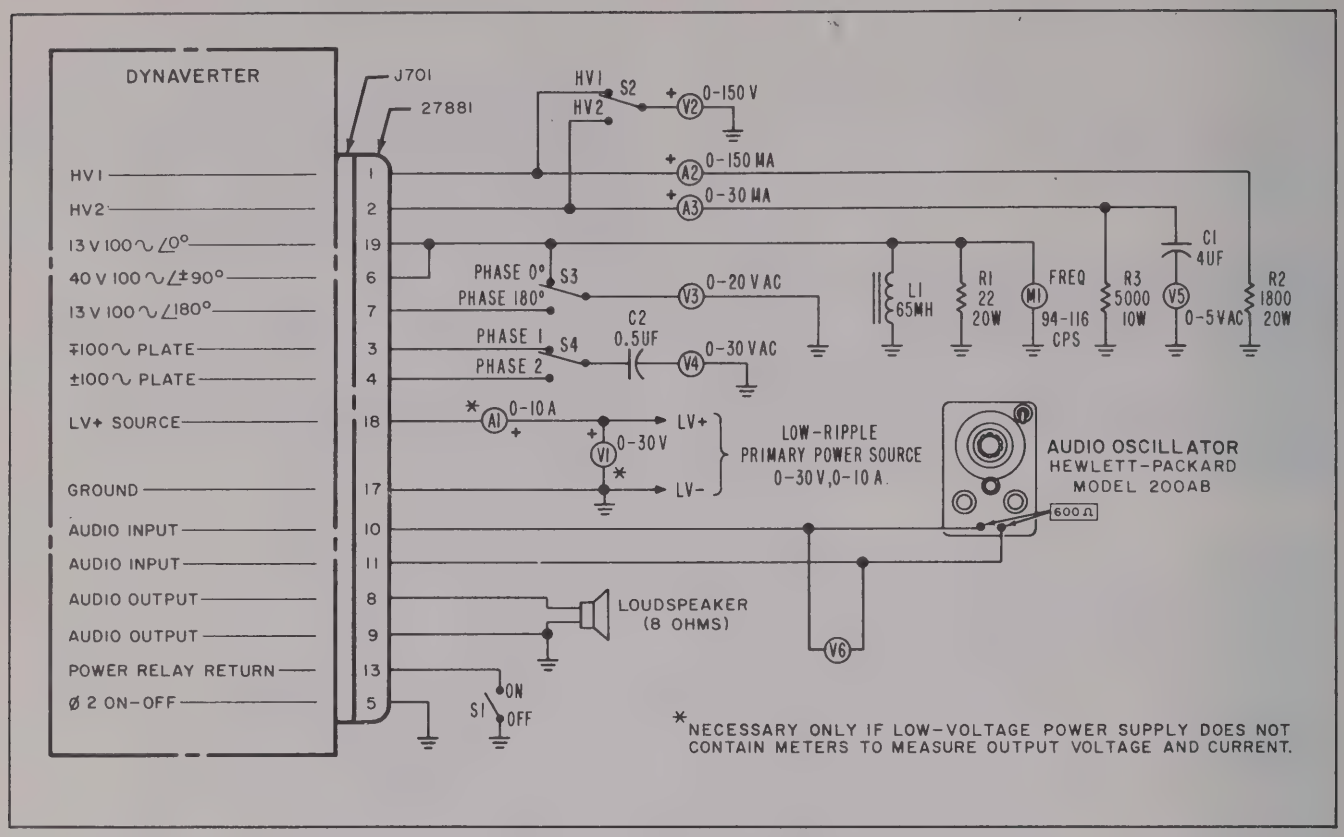


Figure 4-14. Dynaverter, Bench Test Interconnection Diagram

TABLE 4-6. PERFORMANCE AND TROUBLE ANALYSIS

Step	Procedure	Normal Indication	Possible Cause of Abnormal Indication
1	a. Interconnect Dynaverter, power supply, meters, and loads as shown in Figure 4-14. b. Check polarity of input connections to Dynaverter before proceeding. c. Set bench test setup switches as follows: S1 OFF S2 HV1 S3 PHASE 0° S4 PHASE 1 d. Adjust primary power source for zero output.	All meters read zero. Note If the low-voltage power supply does not contain meters to measure its output voltage and current, a 30 volt d-c voltmeter and a 10 ampere d-c ammeter must be connected as shown to measure the voltage and current inputs to the Dynaverter.	None.
2	Turn S1 ON. Slowly increase input voltage until relay K701 energizes. Caution Do not continue to increase input voltage if input current reaches 2 amperes before Dynaverter starts.	V1 indicates between 7 and 11 volts (14 volt model) or between 14 and 18 volts (28 volt model). Voltage indication on V2 shows that Dynaverter circuit is operating.	Polarity of input power connections wrong,[1] K701 or CR703 defective.

[1]If K701 does not operate within the voltage limits specified, connect a jumper across CR703 and perform Step 3 to determine if K701 or CR703 is defective.

TABLE 4-6. PERFORMANCE AND TROUBLE ANALYSIS - Continued

Step	Procedure	Normal Indication	Possible Cause of Abnormal Indication
3	Slowly increase input voltage to 13.75 volts (14 volt model) or 27.5 volts (28 volt model). Watch for excessive input current.	A1 indicates less than 2.0 amperes (14 volt model) or 1.25 amperes (28 volt model). Caution A short circuit is indicated if the input current rises sharply as low voltage is gradually applied or if the input current exceeds 2.2 amperes (14 volt model) or 1.4 amperes (28 volt model). Discontinue test and localize trouble.	Q701, Q702, Q703, Q704, Q705, or Q706 shorted. Shorted winding in T701, T703, T705, C703, C704, or C705 leaky.
4	Check and record reading on M1.	M1 indicates between 97 and 103 cps for either model.	R706 misadjusted.
5	Check and record readings on A2 and V2.	A2 indicates between 65 and 75 ma for either model. V2 indicates between 118 and 138 volts for either model.	A2 reading high - Defective parts in B+ circuit. V2 reading high - Improper primary voltage. V2 reading low - C706 shorted, CR701 or CR702 open, C701, C702, or C704 open.
6	a. Set S2 to HV2. b. Check and record readings on A2 and V2.	A2 indicates between 20 and 24 ma (14 volt model) or between 21 and 24 ma (28 volt model). V2 indicates between 102 and 120 volts (14 volt model) or between 108 and 122 volts (28 volt model).	A2 reading high - Defective parts in B+ circuit. V2 reading high - Improper primary voltage, L702 shorted. V2 reading low - Anything causing low HV1 or C706 shorted.
7	Check and record reading on V5.	Ripple is less than 0.35 volt for either model.	C706 open.
8	Check and record reading on V3.	V3 indicates between 12.0 and 14.5 volts (14 volt model) or between 12.5 and 15.0 volts (28 volt model).	R706 improperly adjusted.
9	a. Set S3 to PHASE 180°. b. Check and record reading on V3.	V3 indicates between 11.0 and 14.0 volts (14 volt model) or between 11.5 and 14.5 volts (28 volt model).	R706 improperly adjusted.
10	a. Check and record reading on V4. b. Set S4 to PHASE 2. c. Check and record reading on V4.	V4 indicates between 17.0 and 22.0 volts on each phase (14 volt model) or between 18.0 and 23.0 on each phase (28 volt model).	T702 defective, C707 or C714 shorted.
11	a. Turn on the Hewlett-Packard Model 200AB Audio Oscillator. Allow approximately 10 minutes for warm-up.	Loudspeaker output at 400 cps sounds normal and without distortion.	Distorted output - RT701 shorted. No output - Q705, Q706, or associated parts defective.

TABLE 4-6. PERFORMANCE AND TROUBLE ANALYSIS - Continued

Step	Procedure	Normal Indication	Possible Cause of Abnormal Indication
11 (cont.)	b. Adjust audio oscillator for a 0.5 to 1.0 volt (V6), 400 cps output. Listen for sound output from loudspeaker.		
12	a. Reduce input voltage to zero. b. Turn S1 OFF. c. Turn audio oscillator off. d. Disconnect Dynaverter.	—	—

ADJUSTMENT OF VARIABLE RESISTOR R706.

Regenerative voltage feedback for the dynaverter 100-cycle circuit is governed by the setting of variable resistor R706 (see Figure 4-24). Since proper feedback is necessary to assure optimum operation of the unit, R706 should be adjusted after replacement of any part in the 100-cycle circuit. Adjust R706 as follows:

Step 1. Remove dust cover from dynaverter. Loosen locknut and turn R706 fully counterclockwise.

Step 2. Interconnect dynaverter, power supply, meters, and loads as shown in Figure 4-14.

Step 3. Set S3 to PHASE 0°, and S1 OFF. Check polarity of input connections to dynaverter, then adjust input voltage to 13.75 volts (14 volt model) or 27.5 volts (28 volt model).

Step 4. Set S1 ON. Slowly turn R706 clockwise until M1 indicates between 95 and 105 cps for both models, and V3 indicates between 12.0 and 14.5 volts (14 volt model) or between 12.5 and 15.0 (28 volt model).

Step 5. Set S3 to PHASE 180°. If necessary adjust R706 for a V3 indication of between 11.0 and 14.0 volts (14 volt model) or between 11.5 and 14.5 (28 volt model). Tighten locknut on R706.

Step 6. Reduce input voltage to zero, set S1 OFF, and disconnect dynaverter. Replace dynaverter dust cover.

Localization of Troubles.

Typical voltage measurements for the dynaverter are listed in Table 4-7. Voltages listed are average, with a tolerance of ±10%. Use a Simpson Model 260 Multimeter, or equivalent, for all measurements. In general, the resistance of transistors as measured from collector to emitter (common test prod of multimeter connected to collector lead and positive test prod connected to emitter) should be much less than the resistance measured in the opposite direction. Similarly, the resistances measured from base (common) to emitter (positive) and from base (common) to collector (positive) should be less than those measured in the opposite directions.

Check the rectifier circuit for shorts. Disconnect the rectifier diodes from the circuit and check their forward and back resistances. In each case, the back resistance should be much greater than the forward resistance. (Specific resistances will depend on the meter and meter scale used.)

Replacement of Parts.

The dynaverter may be serviced in the field; however, replacement parts must be identical to the original parts for optimum performance. Figure 4-24 shows the locations of the dynaverter detail parts. After replacing any part, check performance of the entire ADF 500 system for satisfactory operation.

The three crystal diodes contained in the dynaverter are soldered directly into the circuit; their location and polarity are shown in Figure 4-24. When soldering or unsoldering a diode lead, use pliers to hold the lead between the solder joint and the diode. The pliers form a heat sink and prevent excessive heat from damaging the part. Do not remove the pliers until the heat from the soldered joint has been dissipated.

All transistors are the plug-in type and can be extracted after removal of the two locknuts from each.

TABLE 4-7. DYNAVERTER OPERATING VOLTAGES

Conditions:

1. Voltage measurements are made with a 20,000 ohms-per-volt voltmeter such as Simpson Model 260 Multimeter.

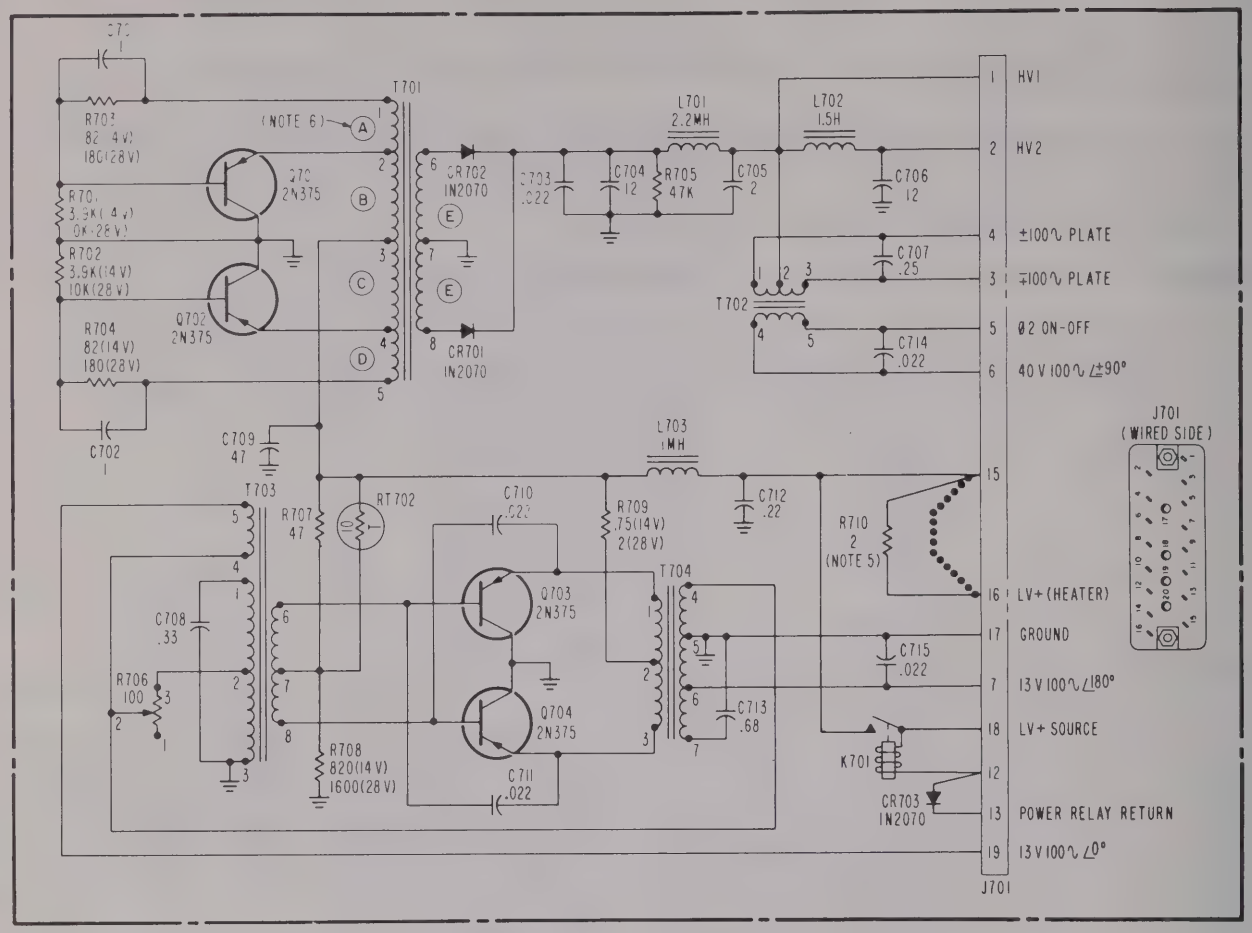
2. d-c voltages are positive and are measured with respect to chassis ground. Except as noted, a-c voltages are measured with respect to chassis ground.

3. Voltages shown in parenthesis are for 14 volt models.

4. Measurements are made with dynaverter connected as shown in Figure 4-14.

Ref Desig	Test Point	d-c Volts	a-c Volts*
J701	Pin 18	27.5 (13.75)	-
CR703	Anode	1.0 approx.	-
	Cathode	0	-
L701	Input	27.5 (13.75)	-
	Output	27.5 (13.75)	-
Q701	Emitter	25.0 (12.75)	0.35 (0.4)
	Base	26.75 (13.0)	0.5 (0.4)
	Collector	-	9.0 (4.1)
Q702	Emitter	25.0 (12.75)	0.35 (0.4)
	Base	26.75 (13.0)	0.5 (0.4)
	Collector	-	9.0 (4.1)
Q703	Emitter	25.5 (12.0)	18.0 (8.9)
	Base	26.4 (12.9)	19.0 (10.0)
	Collector	0	0
Q704	Emitter	25.5 (12.0)	18.0 (8.9)
	Base	26.4 (12.9)	19.0 (10.0)
	Collector	0	0
Q705	Emitter	26.3 (12.6)	-
	Base	26.5 (12.6)	-
	Collector	0.1 (0.1)	-
	Collector-base	-	1.05 (0.8)
	Collector-emitter	-	0.95 (0.65)
Q706	Emitter	26.3 (12.6)	-
	Base	26.5 (12.6)	-
	Collector	0.1 (0.1)	-
	Collector-base	-	1.07 (0.8)
	Collector-emitter	-	0.95 (0.6)

*Measure all a-c voltages (except those on pins 7 and 19) using a 0.1 μf d-c blocking capacitor; if a Simpson Model 260 is used, no external blocking capacitor is required provided the meter function switch is set to OUTPUT.



NOTES:

1. FOR WIRING DIAGRAM SEE FIGURE 4-24.
2. RESISTOR VALUES ARE IN OHMS. MULTIPLIER K = 1000.
3. CAPACITOR VALUES ARE IN MICROFARADS (μF).
4. INDUCTOR VALUES ARE IN HENRIES UNLESS OTHERWISE NOTED.
5. IN 14-VOLT MODEL, R710 IS REPLACED BY WIRE MARKED....
6. CIRCLED LETTERS ARE FOR REFERENCE ONLY.

Figure 4-15. Dynaverter, Schematic Diagram

MAINTENANCE OF INDICATORS.

27470 Indicator.

The 27470 Indicator is a hermetically sealed unit and, except for replacement of the connector and knobs, cannot be repaired in the field unless complete overhaul equipment is available. The indicator performance may be checked by comparing it to the indicator included in the BTK-21 Bench Test Kit, or by substituting a comparable reliable unit. Figure 4-38 is a schematic diagram of the 27470 Indicator. Table 4-8 lists typical resistance measurements for the indicator. The measurements were made with the indicator disconnected.

Connector Replacement.

To replace the connector on the 27470 Indicator, proceed as follows:

Step 1. Remove the three screws which secure the rear cover.

Step 2. Unsolder the wires from the connector. Unscrew the knurled nut to remove the connector.

Step 3. Install the replacement connector and resolder the wires to their proper terminals (see Figure 4-38).

Step 4. Replace the rear cover and secure it with the three screws.

27500 Indicator.

The 27500 Indicator is not hermetically sealed and can therefore be repaired in the field. The performance of the 27500 may be checked by comparing it to the indicator included in the BTK-21 Bench Test Kit, or by substituting a comparable reliable unit. Table 4-8 lists typical resistance measurements for the 27500. The measurements were made with the indicator disconnected. A schematic diagram for the indicator is shown in Figure 4-39.

Connector Replacement.

To replace the connector on the 27500 Indicator, proceed as follows:

Step 1. Remove the two screws from the rear of the indicator and lift the cover off.

Step 2. Remove the four screws attaching the connector to the indicator body then displace the connector.

Step 3. Unsolder the wires from the connector, install the replacement connector, and then resolder the wires (see Figure 4-39).

Step 4. Fasten the connector and cover to the indicator body using the hardware previously removed.

TABLE 4-8.
INDICATOR RESISTANCE MEASUREMENTS

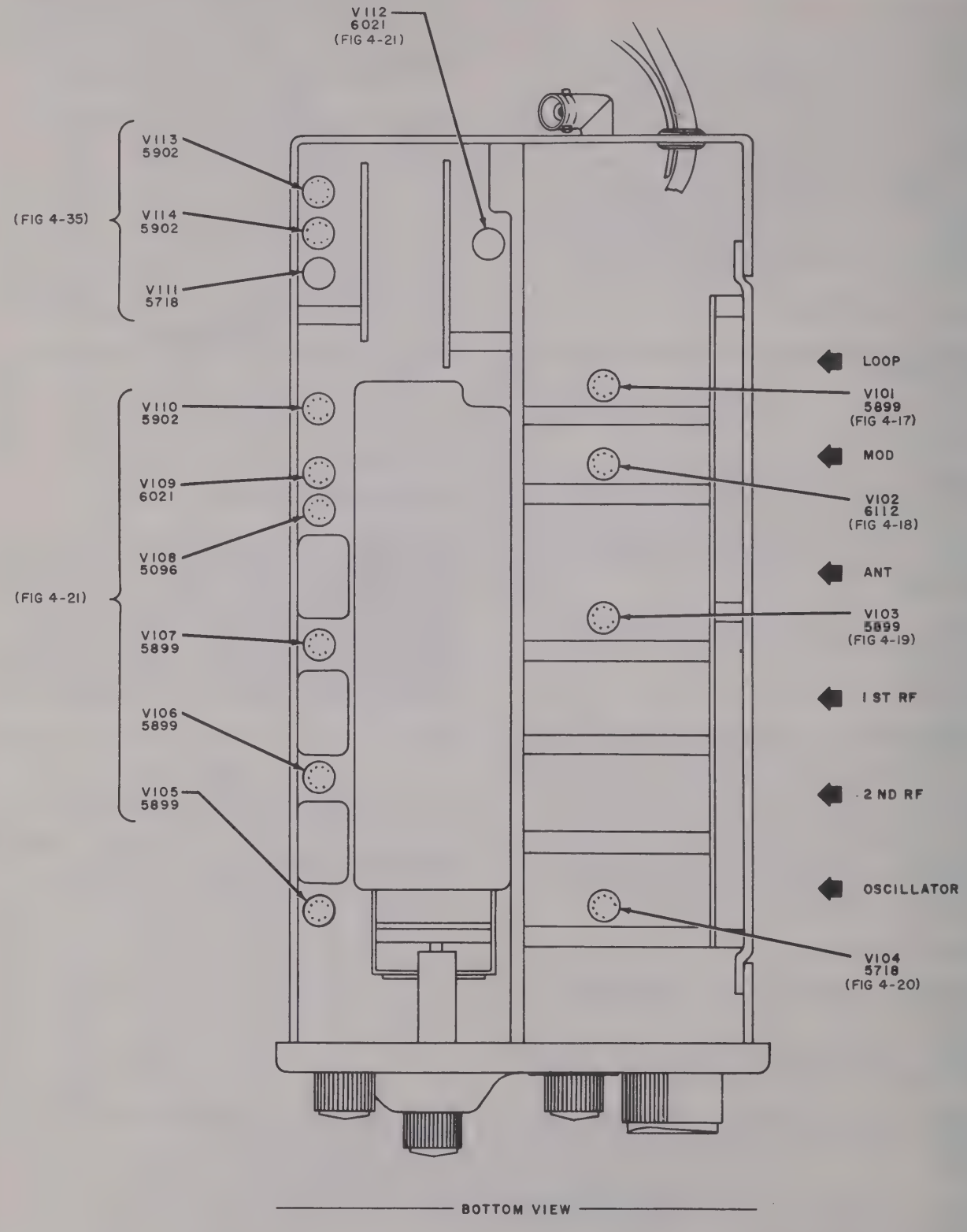
Receptacle	From Terminal	To Terminal	Resistance (ohms)
27470 Indicator			
J601	A	B	10
	A	C	10
	B	C	10
	D	I	30
	K	E	10
	K	F	10
	E	F	10
	G	L	30
27500 Indicator			
J501	A	B	16
	A	C	16
	B	C	16
	A	D	60

MAINTENANCE OF LOOP.

The loop is a hermetically sealed unit and should not be repaired in the field unless complete overhaul facilities are available. Loop Compensation Procedures can be found beginning on page 4-7 of this section. Figures 4-36 and 4-37 are schematic and wiring diagrams of the loop. Table 4-9 lists typical resistance measurements for the loop. Measurements were made with the loop disconnected.

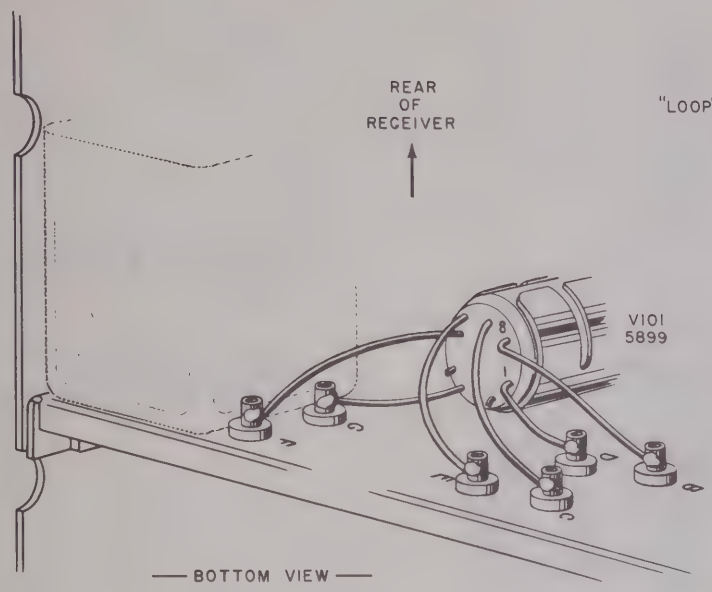
TABLE 4-9.
LOOP RESISTANCE MEASUREMENTS

Receptacle	To Terminal	From Terminal	Resistance (ohms)
J401	A	B	10
	A	F	10
	B	F	10
	C	F	30
	D	F	35
	E	F	465
	A	C	0.1
	B	C	0.1
	A	B	0.2



NOTE: FIGURE NUMBERS IN PARENTHESES REFER TO INDIVIDUAL WIRING DIAGRAMS

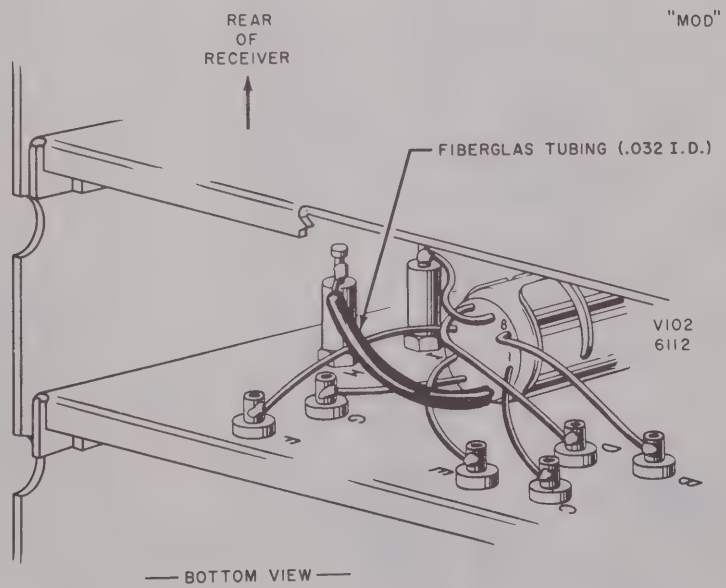
Figure 4-16. Receiver, Tube Location Diagram



NOTES:

1. CUT OFF UNUSED TUBE LEADS 2 AND 4 APPROXIMATELY 1/32 INCH FROM GLASS.
2. TUBE LEADS 1 AND 8 ARE INDICATED TO SHOW PROPER ORIENTATION OF TUBE.

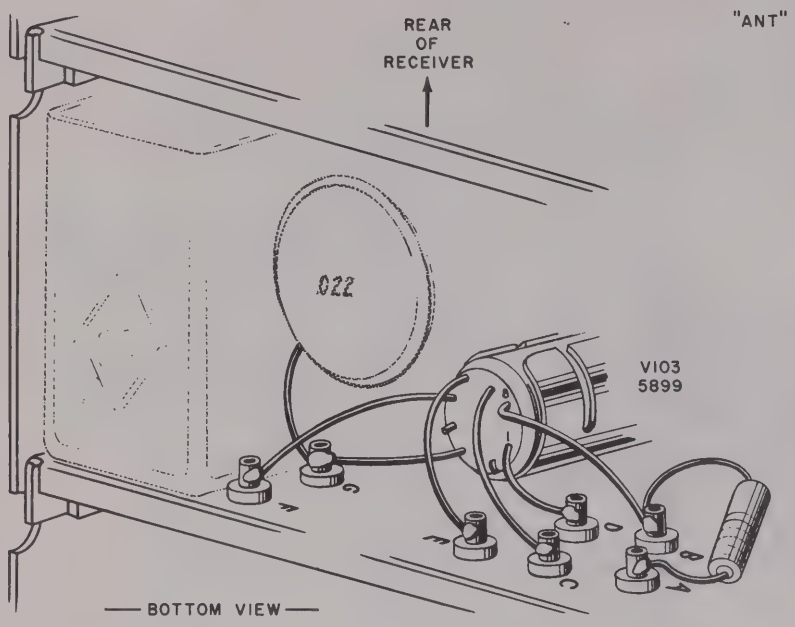
Figure 4-17. Wiring of V101



NOTE:

TUBE LEADS 1 AND 8 ARE INDICATED TO SHOW PROPER ORIENTATION OF TUBE.

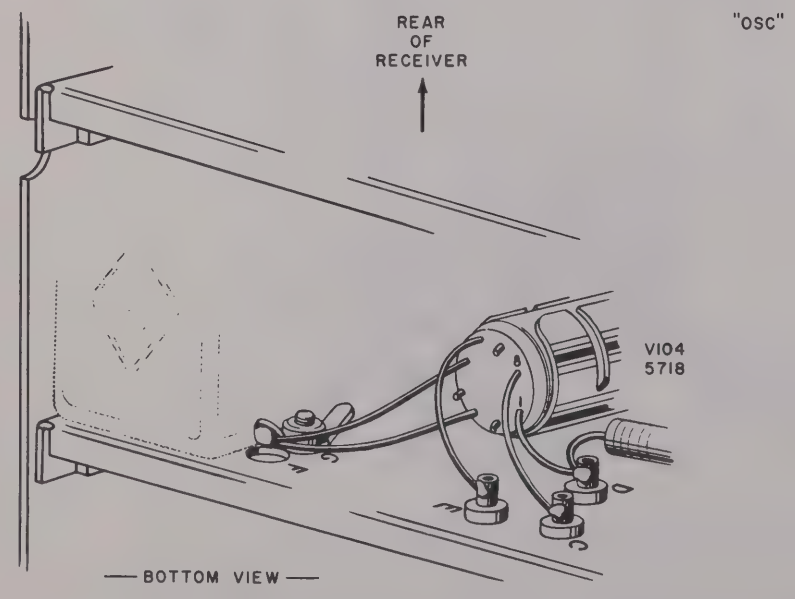
Figure 4-18. Wiring of V102



NOTES:

1. CUT OFF UNUSED TUBE LEADS 2 AND 4 APPROXIMATELY 1/32 INCH FROM GLASS.
2. TUBE LEADS 1 AND 8 ARE INDICATED TO SHOW PROPER ORIENTATION OF TUBE.

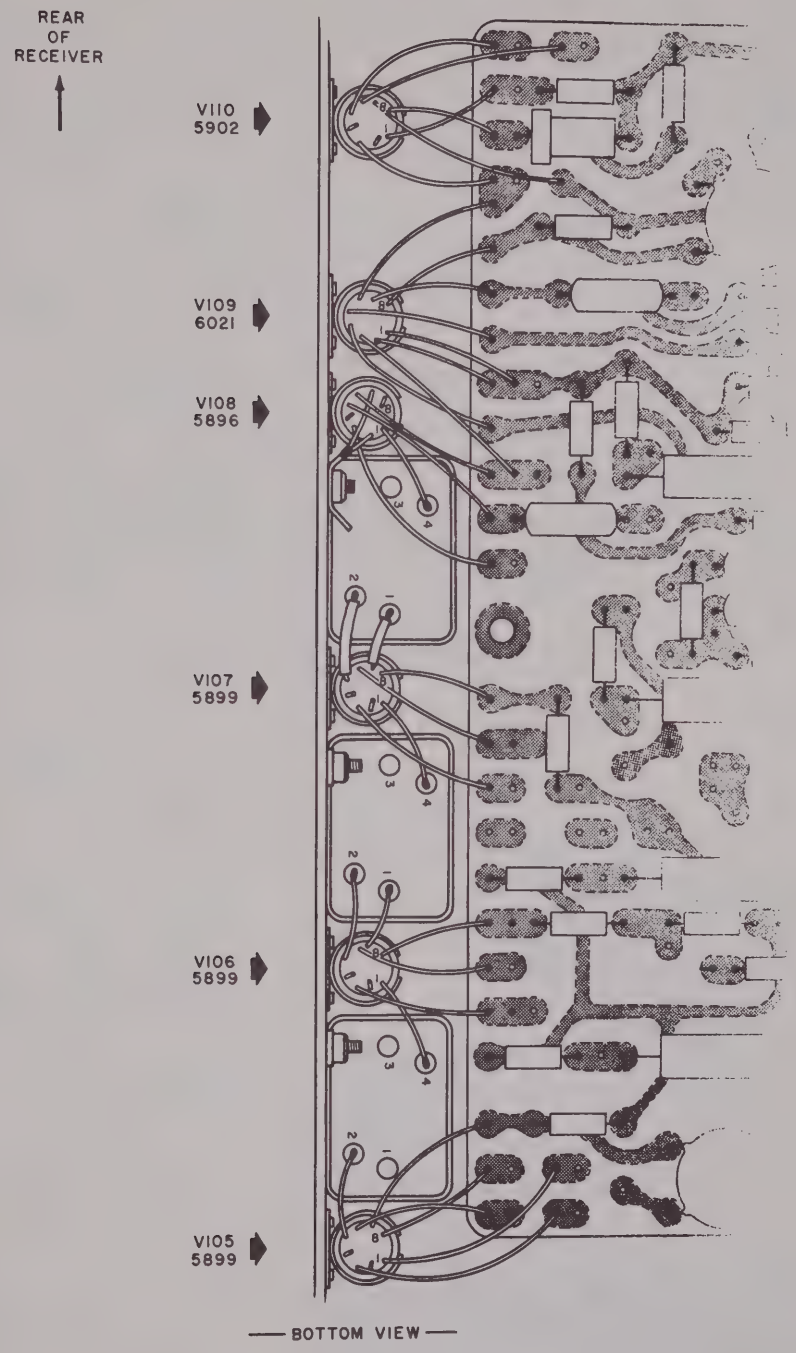
Figure 4-19. Wiring of V103



NOTES:

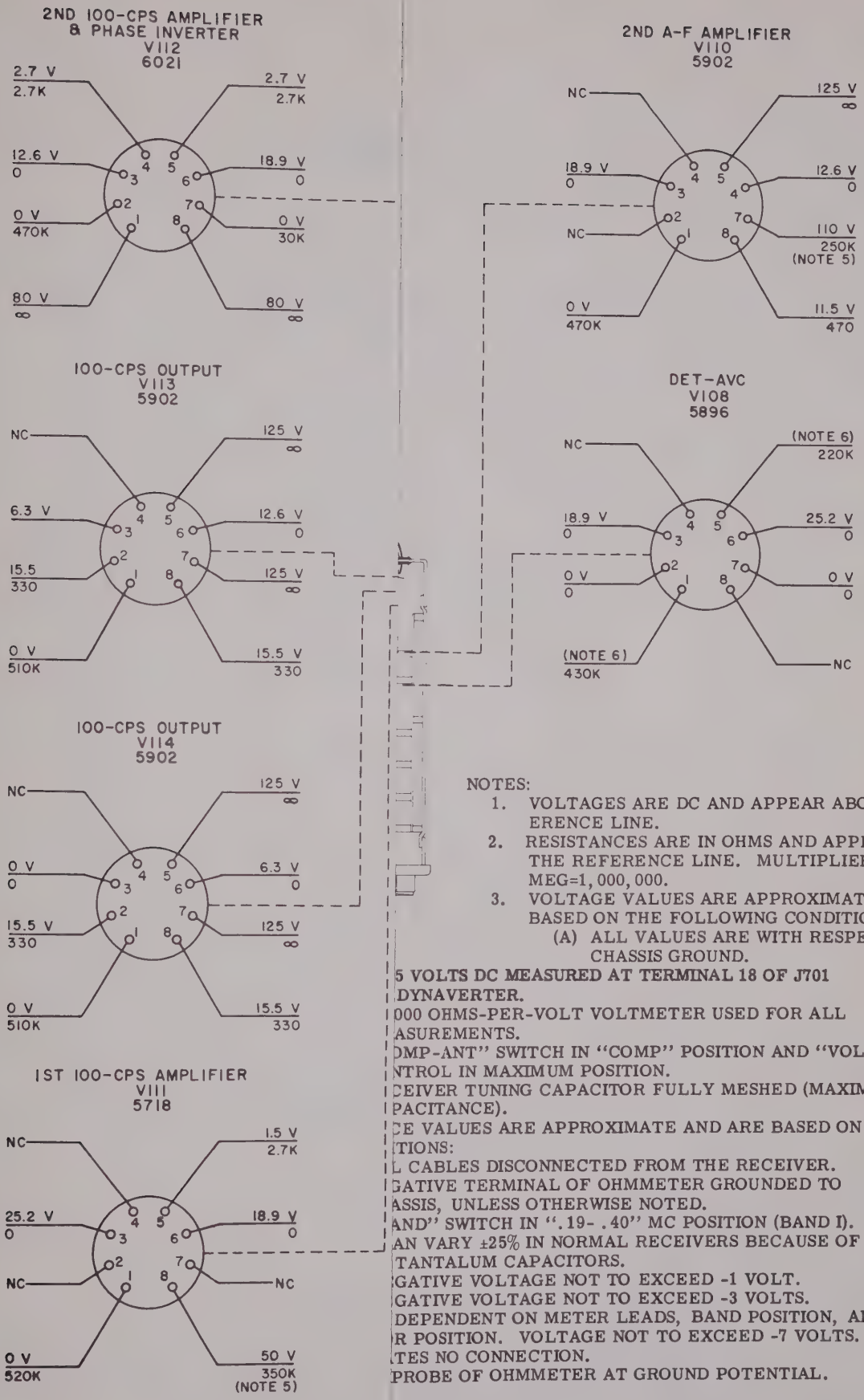
1. CUT OFF UNUSED TUBE LEADS 2, 4, AND 7 APPROXIMATELY 1/32 INCH FROM GLASS.
2. TUBE LEADS 1 AND 8 ARE INDICATED TO SHOW PROPER ORIENTATION OF TUBE.

Figure 4-20. Wiring of V104



NOTES:
1. CUT OFF UNUSED TUBE LEADS APPROXIMATELY 1/32 INCH FROM GLASS.
2. TUBE LEADS 1 AND 8 ARE INDICATED TO SHOW PROPER ORIENTATION OF TUBE.

Figure 4-21. Wiring of V105, V106, V107, V108, V109 and V110

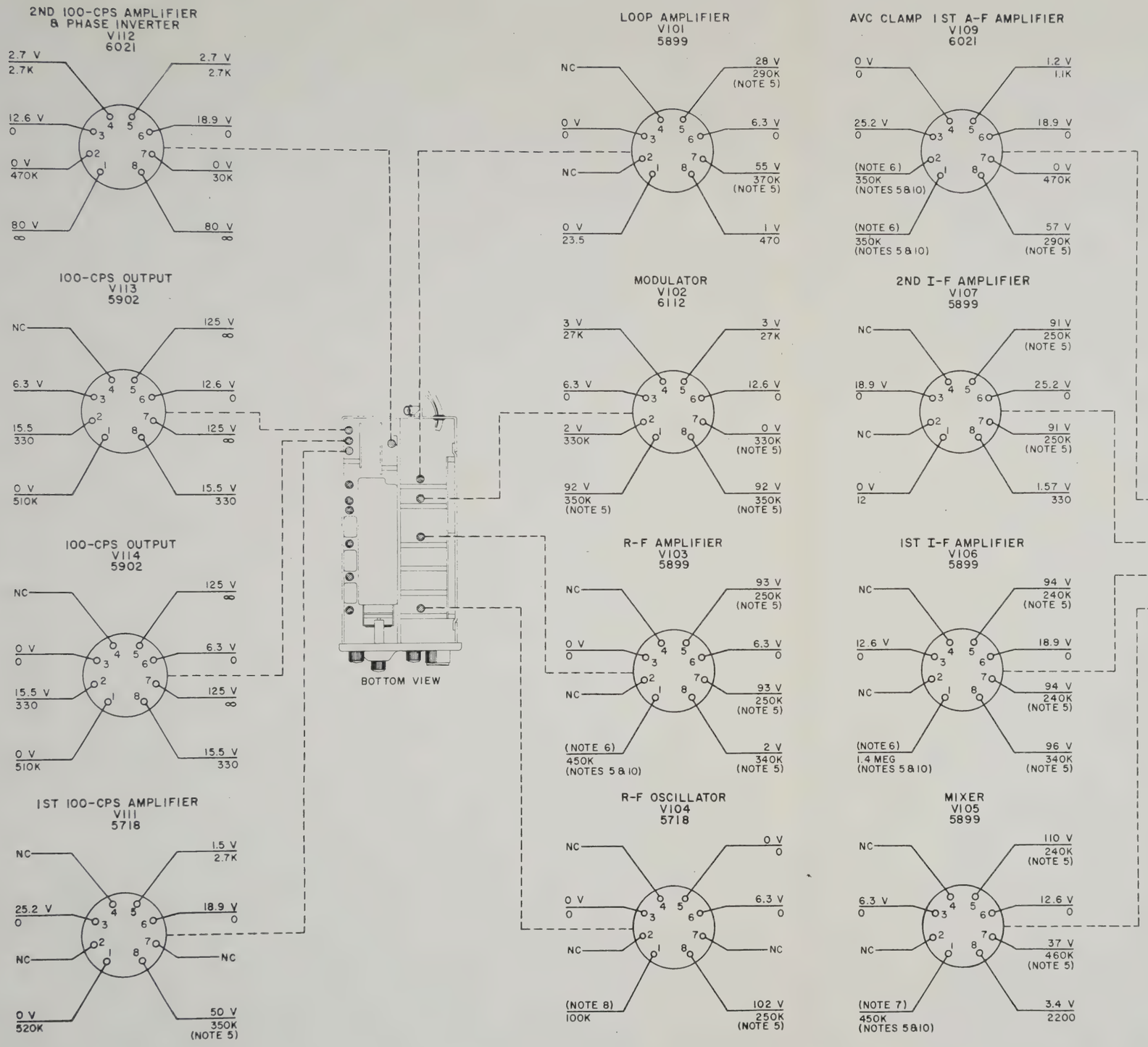


NOTES:

1. VOLTAGES ARE DC AND APPEAR ABOVE THE REFERENCE LINE.
2. RESISTANCES ARE IN OHMS AND APPEAR BELOW THE REFERENCE LINE. MULTIPLIERS: K=1000; MEG=1,000,000.
3. VOLTAGE VALUES ARE APPROXIMATE AND ARE BASED ON THE FOLLOWING CONDITIONS:
   (A) ALL VALUES ARE WITH RESPECT TO CHASSIS GROUND.

5 VOLTS DC MEASURED AT TERMINAL 18 OF J701 DYNAVERTER.
000 OHMS-PER-VOLT VOLTMETER USED FOR ALL ASUREMENTS.
OMP-ANT" SWITCH IN "COMP" POSITION AND "VOL" NTROL IN MAXIMUM POSITION.
CEIVER TUNING CAPACITOR FULLY MESHED (MAXIMUM PACITANCE).
CE VALUES ARE APPROXIMATE AND ARE BASED ON THE FOLLOW-TIONS:
L CABLES DISCONNECTED FROM THE RECEIVER.
GATIVE TERMINAL OF OHMMETER GROUNDED TO ASSIS, UNLESS OTHERWISE NOTED.
AND" SWITCH IN ".19- .40" MC POSITION (BAND I).
AN VARY ±25% IN NORMAL RECEIVERS BECAUSE OF LEAKAGE TANTALUM CAPACITORS.
GATIVE VOLTAGE NOT TO EXCEED -1 VOLT.
GATIVE VOLTAGE NOT TO EXCEED -3 VOLTS.
DEPENDENT ON METER LEADS, BAND POSITION, AND TUNING R POSITION. VOLTAGE NOT TO EXCEED -7 VOLTS.
TES NO CONNECTION.
PROBE OF OHMMETER AT GROUND POTENTIAL.

Figure 4-22. Receiver, Voltage and Resistance Measurements



NOTES:

1. VOLTAGES ARE DC AND APPEAR ABOVE THE REFERENCE LINE.
2. RESISTANCES ARE IN OHMS AND APPEAR BELOW THE REFERENCE LINE. MULTIPLIERS: K=1000; MEG=1,000,000.
3. VOLTAGE VALUES ARE APPROXIMATE AND ARE BASED ON THE FOLLOWING CONDITIONS:
   (A) ALL VALUES ARE WITH RESPECT TO CHASSIS GROUND.
   (B) **27.5 VOLTS DC MEASURED AT TERMINAL 18 OF J701 ON DYNAVERTER.**
   (C) 20,000 OHMS-PER-VOLT VOLTMETER USED FOR ALL MEASUREMENTS.
   (D) "COMP-ANT" SWITCH IN "COMP" POSITION AND "VOL" CONTROL IN MAXIMUM POSITION.
   (E) RECEIVER TUNING CAPACITOR FULLY MESHED (MAXIMUM CAPACITANCE).
4. RESISTANCE VALUES ARE APPROXIMATE AND ARE BASED ON THE FOLLOWING CONDITIONS:
   (A) ALL CABLES DISCONNECTED FROM THE RECEIVER.
   (B) NEGATIVE TERMINAL OF OHMMETER GROUNDED TO CHASSIS, UNLESS OTHERWISE NOTED.
   (C) "BAND" SWITCH IN ".19- .40" MC POSITION (BAND I).
5. VALUES CAN VARY ±25% IN NORMAL RECEIVERS BECAUSE OF LEAKAGE THROUGH TANTALUM CAPACITORS.
6. SMALL NEGATIVE VOLTAGE NOT TO EXCEED -1 VOLT.
7. SMALL NEGATIVE VOLTAGE NOT TO EXCEED -3 VOLTS.
8. VOLTAGE DEPENDENT ON METER LEADS, BAND POSITION, AND TUNING CAPACITOR POSITION. VOLTAGE NOT TO EXCEED -7 VOLTS.
9. NC INDICATES NO CONNECTION.
10. POSITIVE PROBE OF OHMMETER AT GROUND POTENTIAL.

Figure 4-22. Receiver, Voltage and Resistance Measurements

CESSNA ADF 500

Diagrams

Figure 4-23. ADF 500 with Dynaverter, Interconnection Diagram

Figure 4-24. Dynaverter, Wiring Diagram

Figure 4-25. Receiver, Schematic Diagram

Figure 4-26. Receiver, Main Chassis Wiring Diagram

Figure 4-27. Receiver, Loop Amplifier Z101, Wiring Diagram

Figure 4-28. Receiver, Modulator Z102, Wiring Diagram

Figure 4-29. Receiver, Antenna Assembly Z103, Wiring Diagram

Figure 4-30. Receiver, First r-f Z104, Wiring Diagram

Figure 4-31. Receiver, Second r-f Z105, Wiring Diagram

Figure 4-32. Receiver, Oscillator Z106, Wiring Diagram

Figure 4-33. Receiver, i-f and a-f Amplifier, Wiring Diagram

Figure 4-34. Receiver, 100 cps Amplifier V112, Wiring Diagram

Figure 4-35. Receiver, 100 cps Amplifiers V111, V113, and V114, Wiring Diagram

Figure 4-36. Loop Antenna, Schematic Diagram

Figure 4-37. Loop Antenna, Wiring Diagram

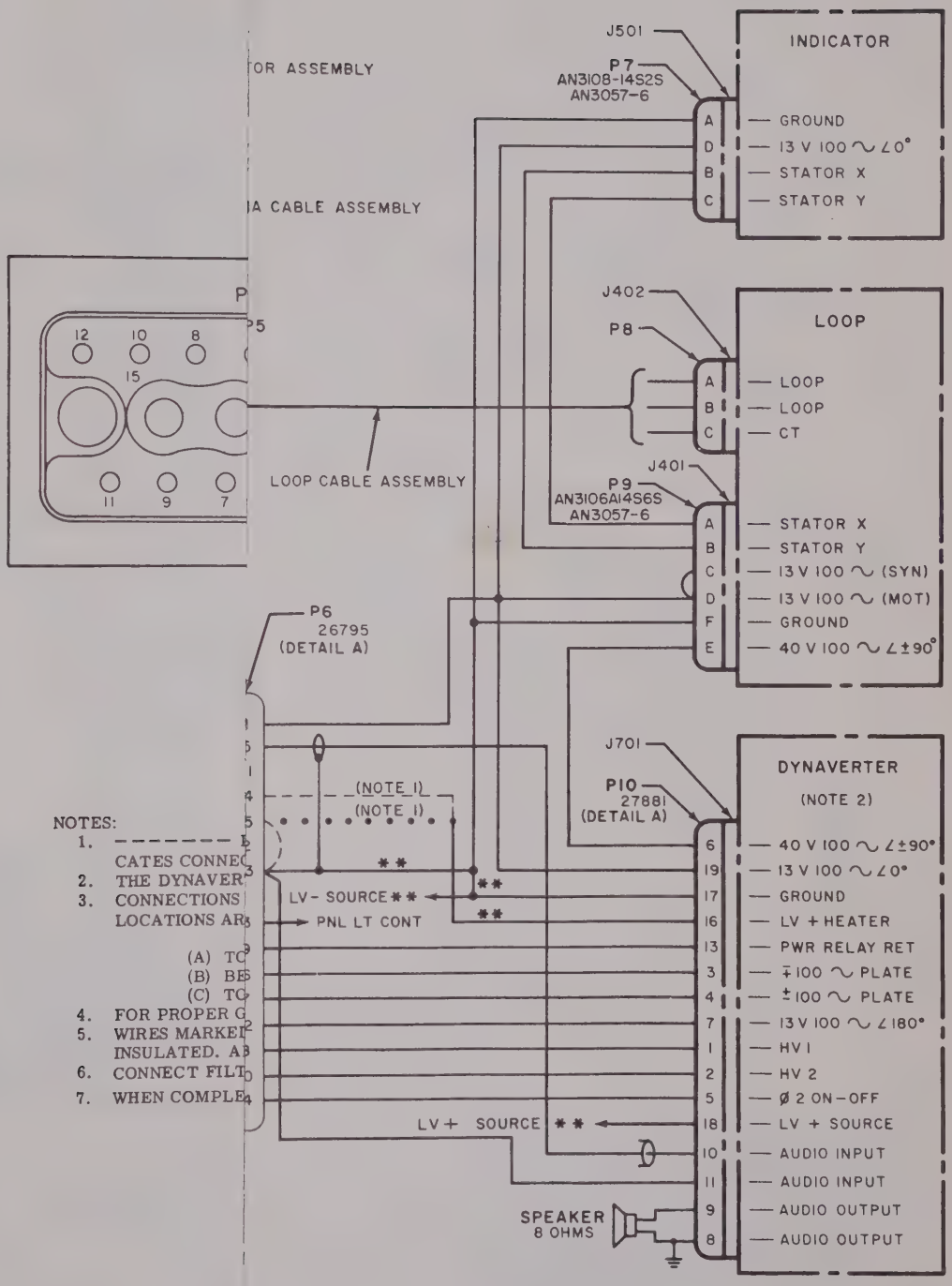
Figure 4-38. 27470 Indicator, Schematic Diagram

Figure 4-39. 27500 Indicator, Schematic Diagram

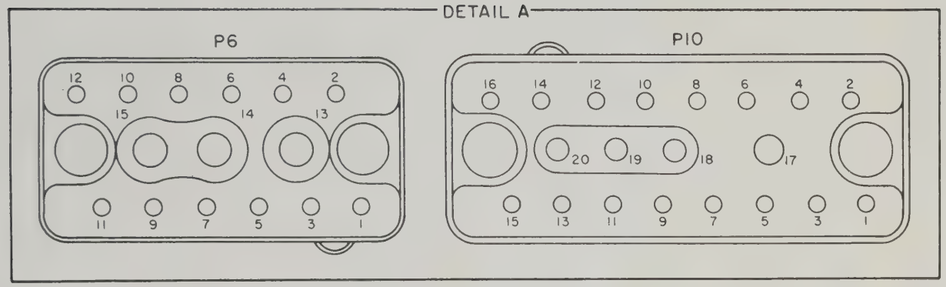
Figure 4-40. Filter Assembly 27859, Schematic Diagram

Figure 4-41. Filter Assembly 27859, Wiring Diagram

Figure 4-42. Cable Assembly 28050, Schematic Diagram



gure 4-23. ADF 500 with Dynaverter, Interconnection Diagram



AMPHENOL REPLACEMENT INSERT NUMBERS
P6 - 126 - 150
P10 - 126 - 807

NOTES:

1. – – – – – – – LINES INDICATE CONNECTION FOR 14-VOLT OPERATION. • • • • • • • • • • LINE INDICATES CONNECTION FOR 28-VOLT OPERATION.
2. THE DYNAVERTER IS VOLTAGE SENSITIVE AND MUST BE MATCHED TO SUPPLY VOLTAGE.
3. CONNECTIONS ARE SHOWN FOR BELLY-MOUNTED LOOP AND SENSE ANTENNA. IF OTHER ANTENNA LOCATIONS ARE USED, INTERCHANGE CONNECTIONS AT UNITS AS FOLLOWS:

	DYNAVERTER	INDICATOR	RECEIVER
(A) TOP LOOP, BELLY ANTENNA	F & G	B & C	-
(B) BELLY LOOP, TOP ANTENNA	F & G	-	1 & 12
(C) TOP LOOP, TOP ANTENNA	-	B & C	1 & 12

4. FOR PROPER GROUNDING OF SYSTEM, AIRCRAFT SURFACE MUST BE CLEAN, BARE METAL.
5. WIRES MARKED WITH A DOUBLE ASTERISK (**) ARE NO. 16 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. ALL OTHER WIRES ARE NO. 20 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED.
6. CONNECT FILTER KIT 27873, IF USED, BETWEEN P2 AND P6.
7. WHEN COMPLETE PLUG IS NEEDED ORDER BY PART NUMBER SHOWN IN DIAGRAM.

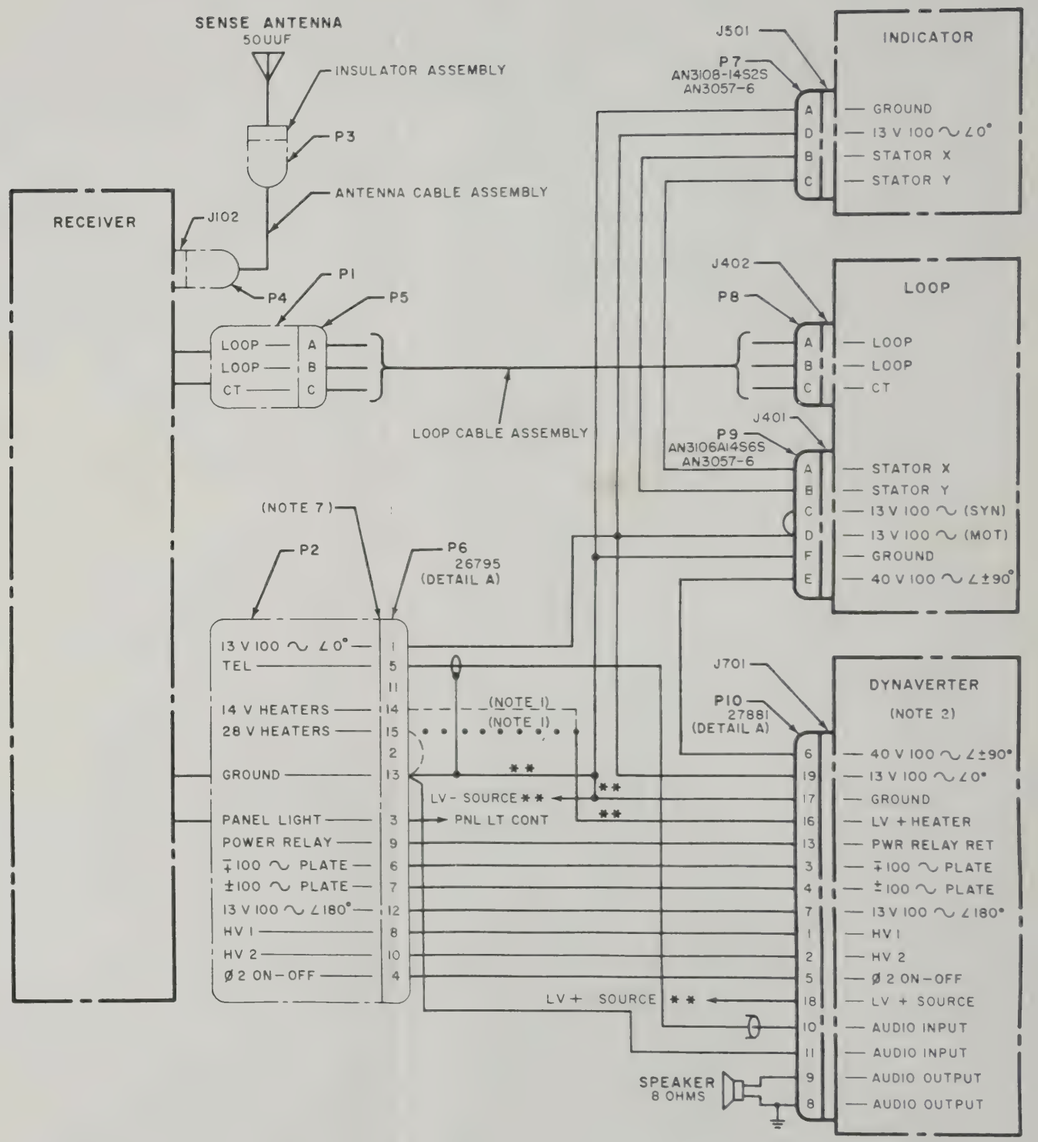
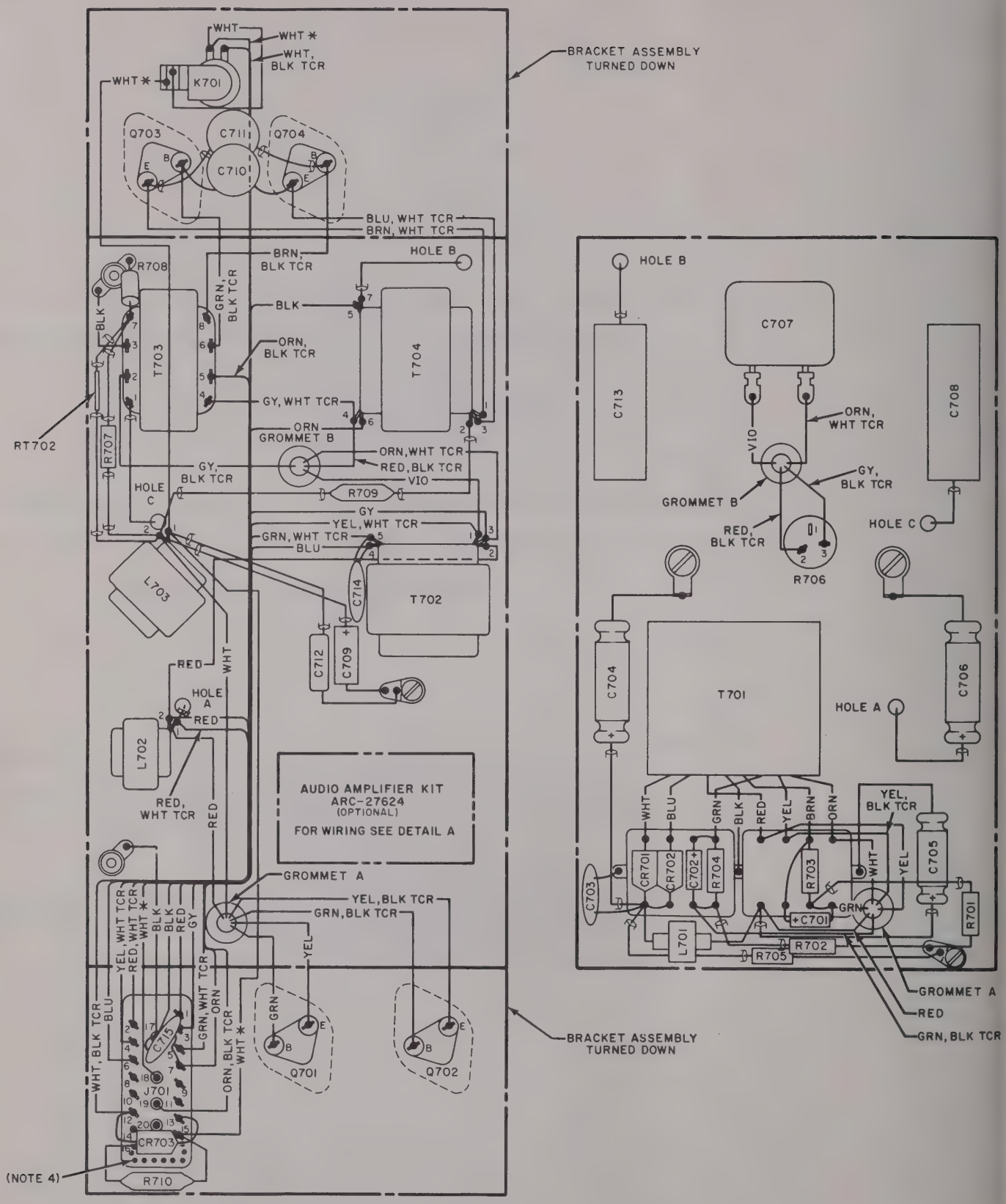


Figure 4-23. ADF 500 with Dynaverter, Interconnection Diagram


BRACKET ASSEMBLY TURNED DOWN
WHT
WHT *
WHT, BLK TCR
K701
Q703
C711
C710
Q704
BLU, WHT TCR
BRN, WHT TCR
BRN, BLK TCR
HOLE B
R708
GRN, BLK TCR
BLK
T703
T704
ORN, BLK TCR
GY, WHT TCR
ORN GROMMET B
ORN, WHT TCR
RED, BLK TCR
VIO
R709
GY, BLK TCR
HOLE C
GY
YEL, WHT TCR
GRN, WHT TCR
BLU
RT702
R707
L703
C714
T702
C712
C709
RED
WHT
HOLE A
L702
RED
RED, WHT TCR
AUDIO AMPLIFIER KIT ARC-27624 (OPTIONAL)
FOR WIRING SEE DETAIL A
GROMMET A
YEL, BLK TCR
GRN, BLK TCR
YEL
YEL, WHT TCR
RED, WHT TCR
WHT *
BLK
BLK
RED
GY
GRN, WHT TCR
ORN
ORN, BLK TCR
WHT *
WHT, BLK TCR
BLU
C715
J701
CR703
R710
(NOTE 4)
GRN
Q701
Q702
BRACKET ASSEMBLY TURNED DOWN
HOLE B
C707
C713
C708
VIO
ORN, WHT TCR
GY, BLK TCR
GROMMET B
RED, BLK TCR
R706
HOLE C
C704
T701
C706
HOLE A
WHT
BLU
GRN
BLK
RED
YEL
BRN
ORN
YEL, BLK TCR
CR701
CR702
C702
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+C701
L701
R702
R705
R701
GROMMET A
RED
GRN, BLK TCR

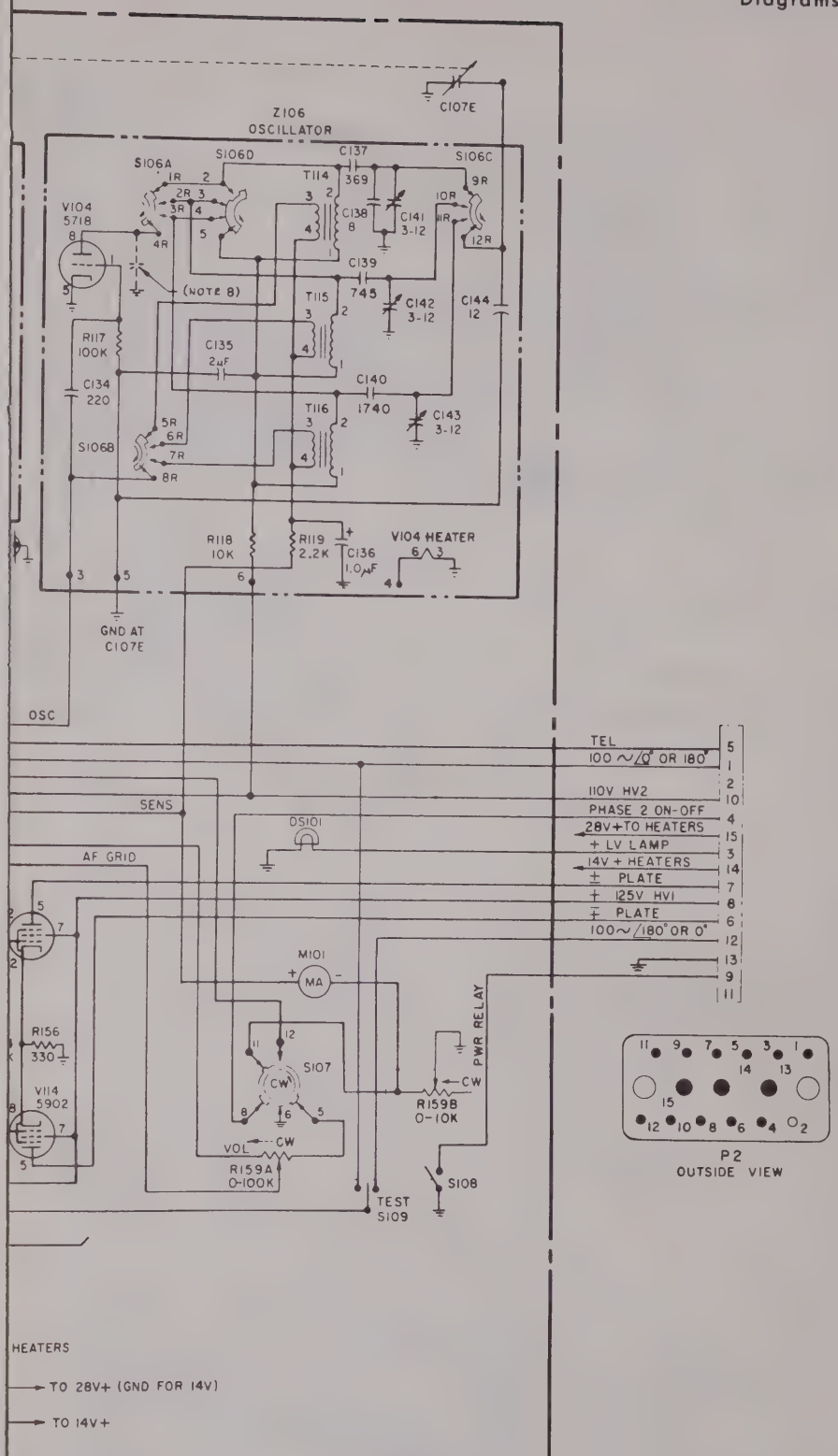
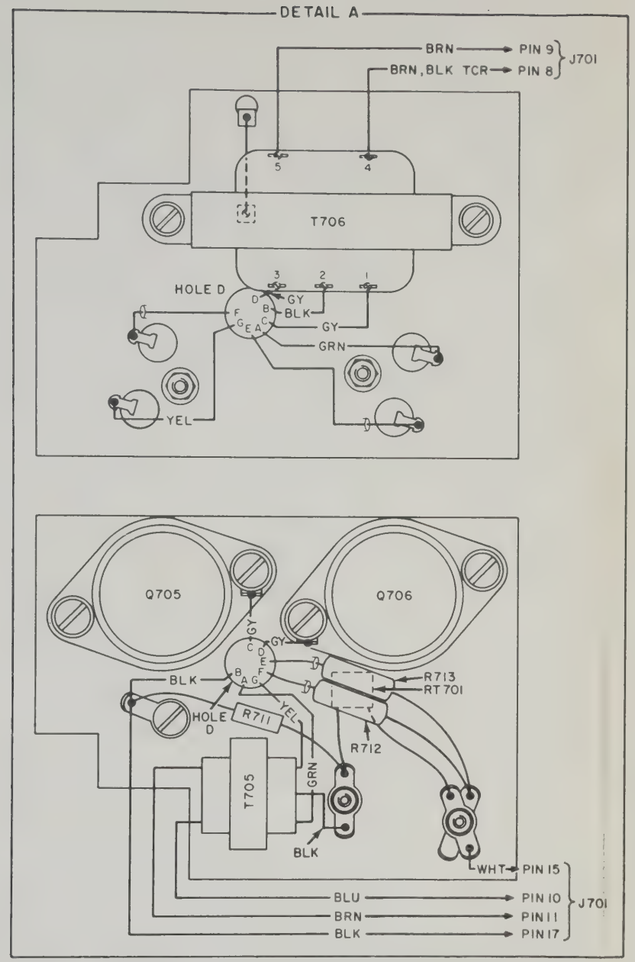
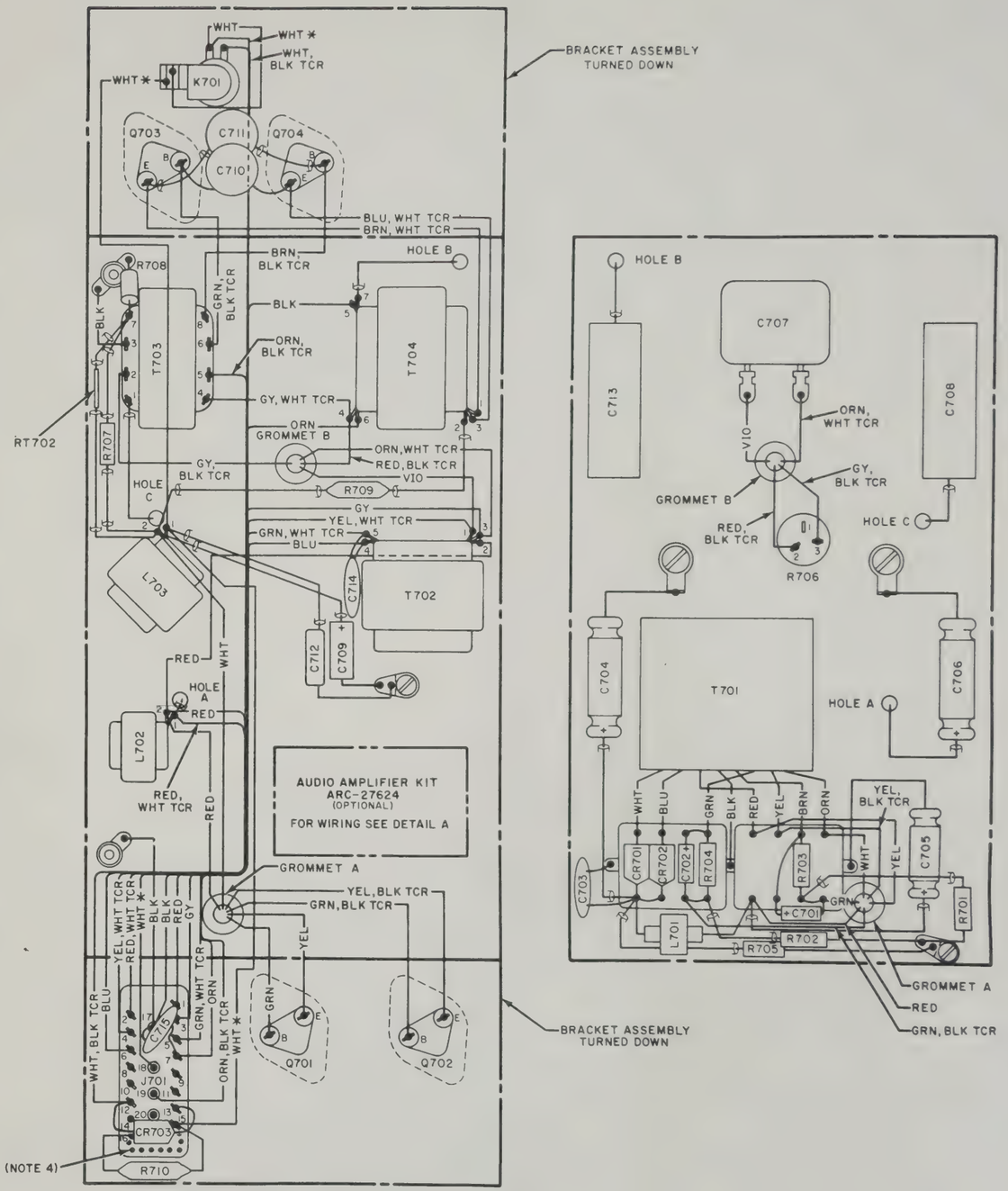


Figure 4-25. Receiver, Schematic Diagram





NOTES:

1. FOR SCHEMATIC DIAGRAM SEE FIGURE 4-15.
2. UNMARKED WIRES ARE NO. 22 AWG BARE, SOLID, TINNED COPPER. WIRES MARKED WITH COLOR NOTE ARE NO. 24 AWG STRANDED COPPER, TEFLON INSULATED. WIRES MARKED WITH COLOR NOTE AND ASTERISK (*) ARE NO. 22 STRANDED COPPER, TEFLON INSULATED.
3. TEFLON TUBING (0.040 IN. I.D.) INSTALLED OVER WIRES DESIGNATED WITH ⊟ .
4. IN 14-VOLT MODEL, R710 IS REPLACED BY WIRE MARKED....

Figure 4-24. Dynaverter, Wiring Diagram

NOTES:

1. ASSOCIATED WIRING DIAGRAMS ARE AS FOLLOWS:

SUBASSEMBLY	FIGURE NO.
MAIN CHASIS	4-26
LOOP AMPLIFIER	4-27
MODULATOR	4-28
ANTENNA ASSEMBLY	4-29
1ST r-f	4-30
2ND r-f	4-31
OSCILLATOR	4-32
i-f AND a-f AMPLIFIER	4-33
2ND 100 CPS AMPLIFIER	4-34
100 CPS AMPLIFIER	4-35

2. INDUCTANCE VALUES ARE IN MICROHENRIES (μH), UNLESS OTHERWISE NOTED.
3. CAPACITANCE VALUES ARE IN MICROMICROFARADS ($\mu\mu$F), UNLESS OTHERWISE NOTED.
4. RESISTANCE VALUES ARE IN OHMS. MULTIPLIERS: K=1000; MEG=1,000,000.
5. BAND SWITCH SECTIONS S101-S106 ARE SHOWN IN BAND I (190-400KC) POSITION, UNLESS OTHERWISE NOTED. SWITCH SECTIONS SHOWN ARE AS VIEWED FROM THE FRONT OF THE RECEIVER WITH ROTORS AND TERMINALS IN THE SAME RELATIVE POSITION (BAND I). S101-S106 ARE ON A COMMON SHAFT. ANGULAR THROWS ARE 30° BETWEEN ALL BANDS. STATOR SECTORS ARE REPRESENTED BY THE LETTERS A, B, AND C FOR THE FRONT SECTORS, AND D FOR THE REAR SECTOR. STATOR SECTORS IN USE ARE AS FOLLOWS: S101 - A, B, C, D; S102 - A, B, D; S103 - A, B; S104 - A, B, D; S105 - A, B, C, D; S106 - A, B, C, D.
6. THE INTERMEDIATE FREQUENCY (I.F.) IS 142.5 KC (OSCILLATOR FREQUENCY IS HIGHER THAN SIGNAL FREQUENCY).
7. S107 SHOWN IN COMP POSITION.
8. C181 (3 OR 5 $\mu\mu$F) INSTALLED IN SOME UNITS DURING FINAL FACTORY ADJUSTMENT.

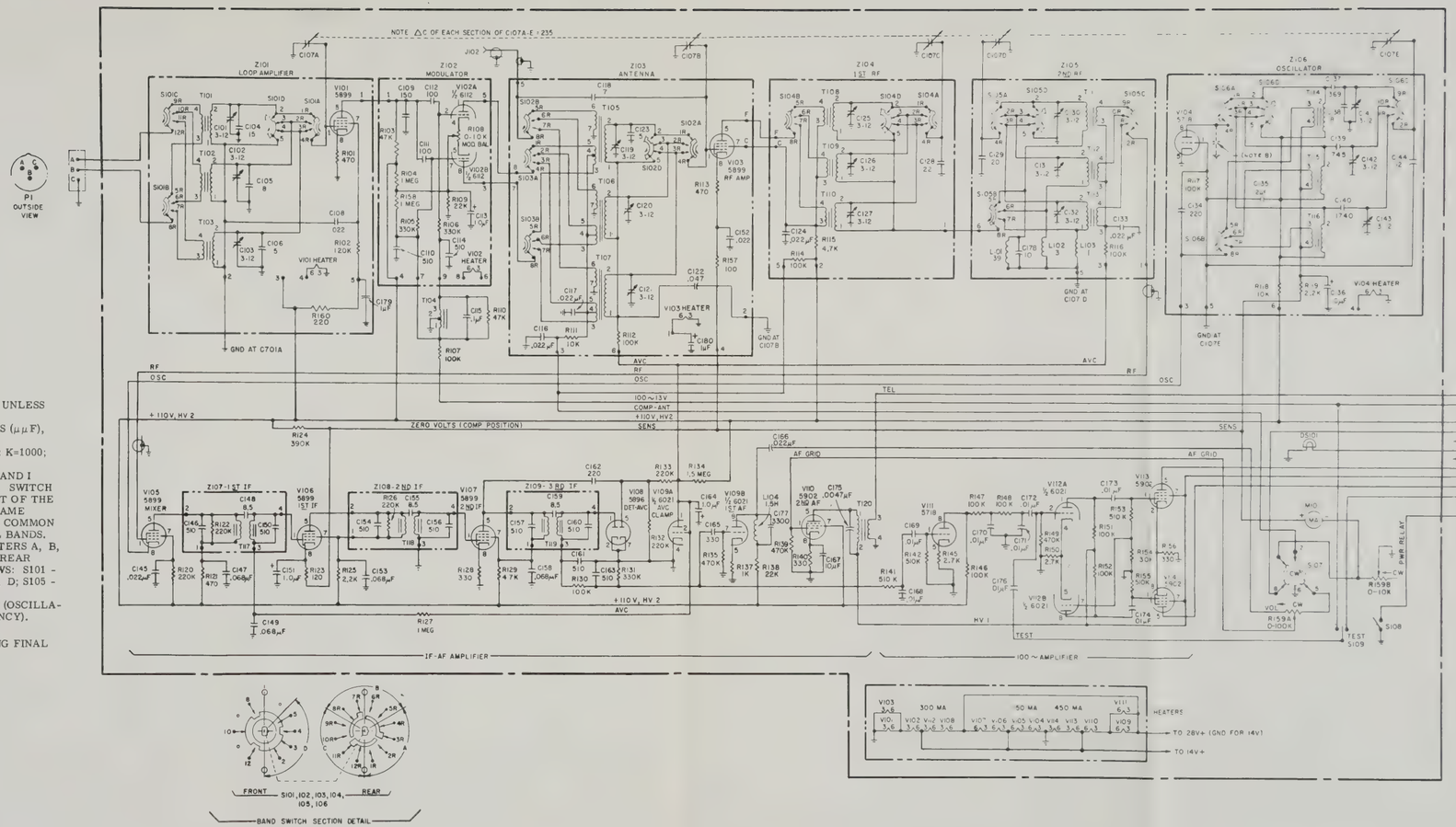
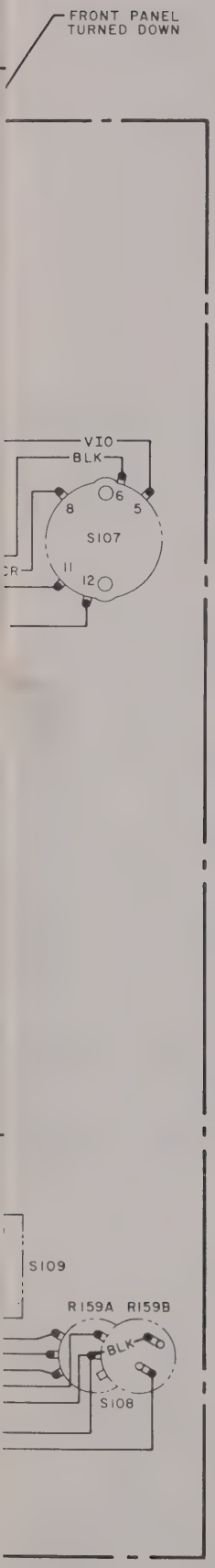
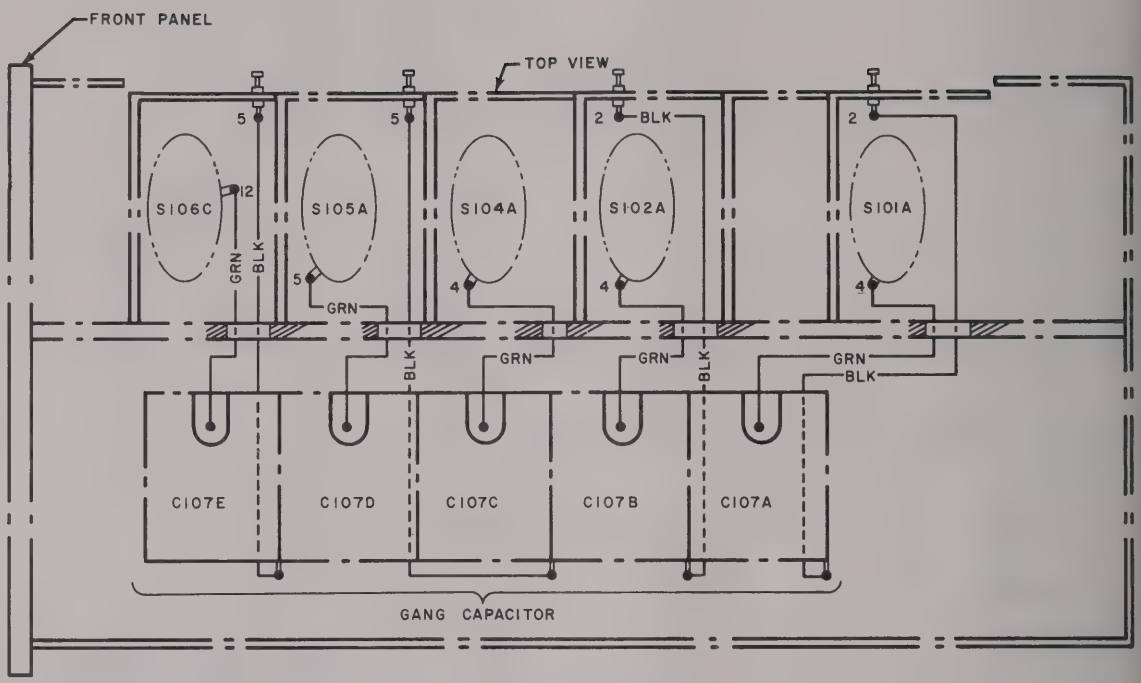


Figure 4-25. Receiver, Schematic Diagram



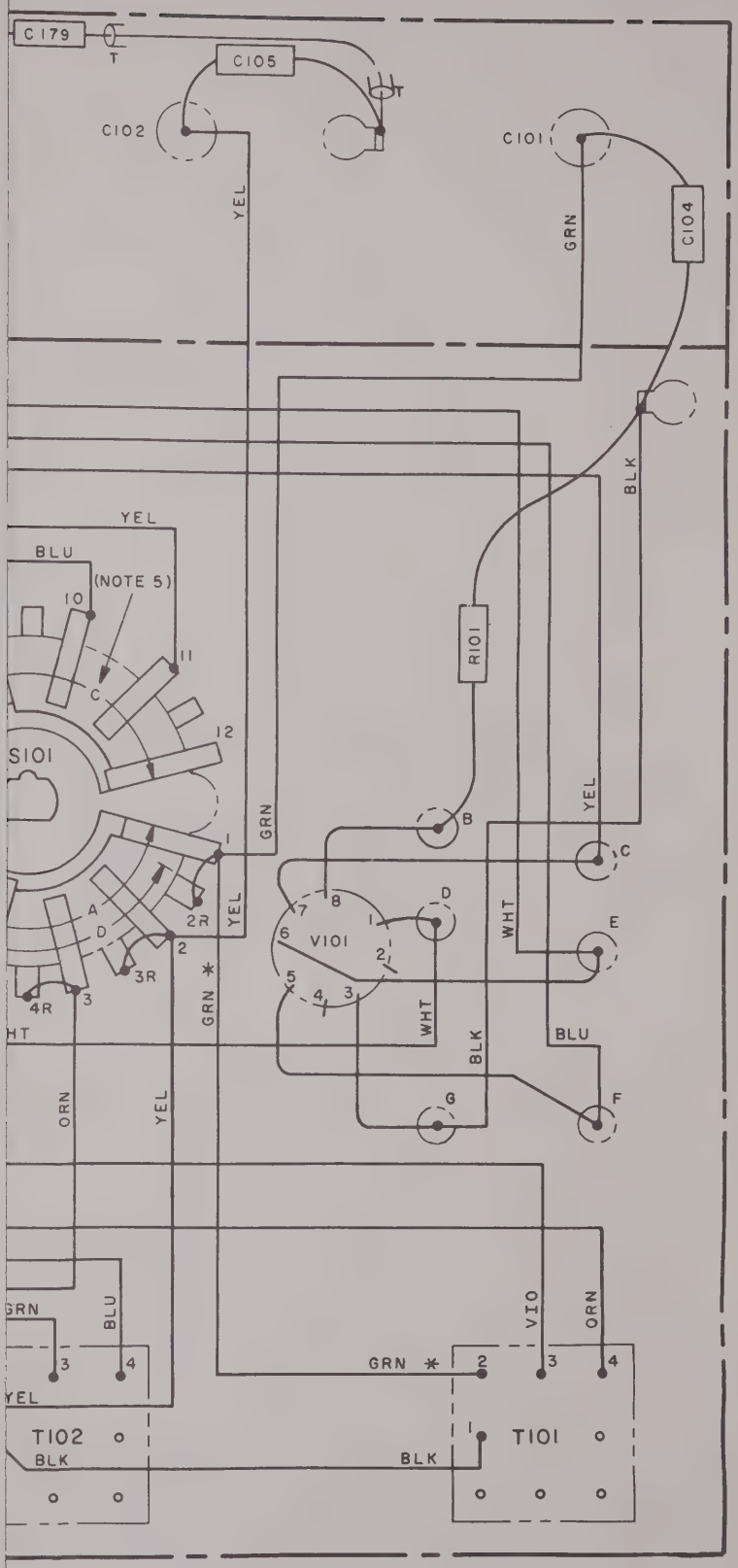


NOTES:

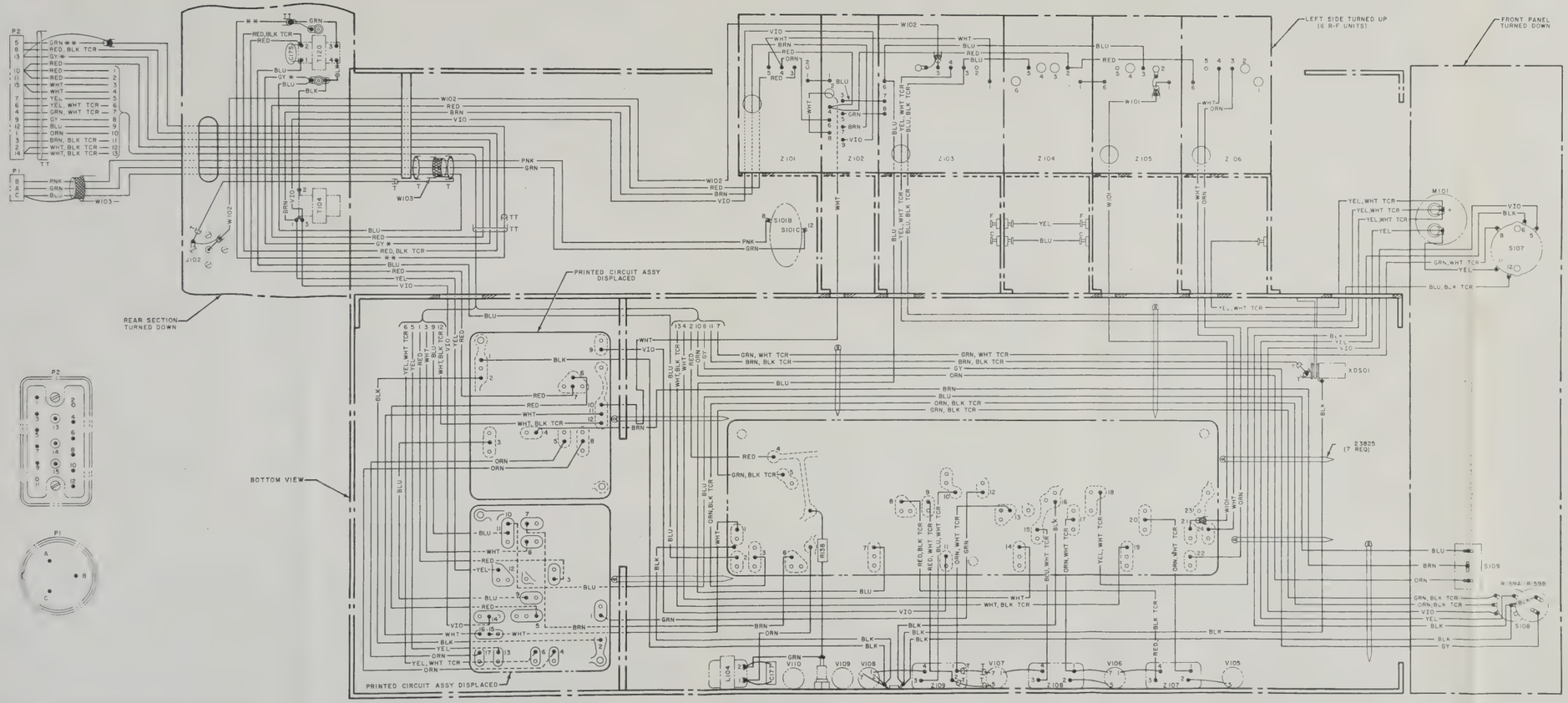
1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 4-25.
2. ASSOCIATED WIRING DIAGRAMS ARE AS FOLLOWS:

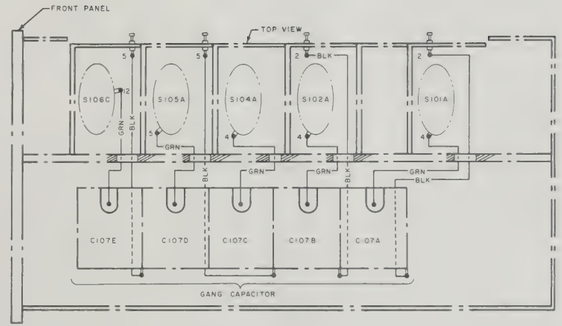
SUBASSEMBLY	FIGURE NO.
LOOP AMPLIFIER	4-27
MODULATOR	4-28
ANTENNA ASSEMBLY	4-29
1ST r-f	4-30
2ND r-f	4-31
OSCILLATOR	4-32
i-f AND a-f AMPLIFIER	4-33
2ND 100 CPS AMPLIFIER	4-34
100 CPS AMPLIFIER	4-35

3. WIRES MARKED WITH COLOR NOTE ONLY ARE NO. 24 AWG STRANDED COPPER, TEFLON INSULATED.
4. WIRE MARKED WITH COLOR NOTE AND ASTERISK (*) IS NO. 16 AWG STRANDED COPPER, VINYLITE INSULATED.
5. WIRE MARKED WITH COLOR NOTE AND DOUBLE ASTERISK (**) IS NO. 22 AWG SINGLE CONDUCTOR COPPER, TEFLON INSULATED, WITH BRAIDED SHIELD.
6. UNMARKED WIRES ARE NO. 24 AWG BARE, SOLID, TINNED COPPER.
7. TEFLON TUBING OF APPROPRIATE SIZE INSTALLED OVER WIRES MARKED "T."
8. VINYLITE TUBING OF APPROPRIATE SIZE INSTALLED OVER WIRES MARKED "TT."



igure 4-27. Receiver, Loop Amplifier Z101, Wiring Diagram





NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 4-25.
2. ASSOCIATED WIRING DIAGRAMS ARE AS FOLLOWS:

SUBASSEMBLY	FIGURE NO.
LOOP AMPLIFIER	4-27
MODULATOR	4-28
ANTENNA ASSEMBLY	4-29
1ST r-f	4-30
2ND r-f	4-31
OSCILLATOR	4-32
i-f AND a-f AMPLIFIER	4-33
2ND 100 CPS AMPLIFIER	4-34
100 CPS AMPLIFIER	4-35

3. WIRES MARKED WITH COLOR NOTE ONLY ARE NO. 24 AWG STRANDED COPPER, TEFLON INSULATED.
4. WIRE MARKED WITH COLOR NOTE AND ASTERISK (*) IS NO. 16 AWG STRANDED COPPER, VINYLITE INSULATED.
5. WIRE MARKED WITH COLOR NOTE AND DOUBLE ASTERISK (**) IS NO. 22 AWG SINGLE CONDUCTOR COPPER, TEFLON INSULATED, WITH BRAIDED SHIELD.
6. UNMARKED WIRES ARE NO. 24 AWG BARE, SOLID, TINNED COPPER.
7. TEFLON TUBING OF APPROPRIATE SIZE INSTALLED OVER WIRES MARKED "T."
8. VINYLITE TUBING OF APPROPRIATE SIZE INSTALLED OVER WIRES MARKED "TT."

Figure 4-26. Receiver, Main Chassis Wiring Diagram

NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 4-25.
2. FOR MAIN CHASSIS WIRING DIAGRAM, SEE FIGURE 4-26.
3. WIRES MARKED WITH COLOR NOTE ARE NO. 24 AWG SOLID COPPER, TEFLON INSULATED.
4. UNMARKED WIRES ARE NO. 24 AWG BARE, SOLID, TINNED COPPER.
5. SWITCH SECTIONS:

SECTION	TERMINALS
S101A	1, 2, 3, 4
S101B	5, 6, 7, 8
S101C	9, 10, 11, 12
S101D	2R, 3R, 4R, 5R

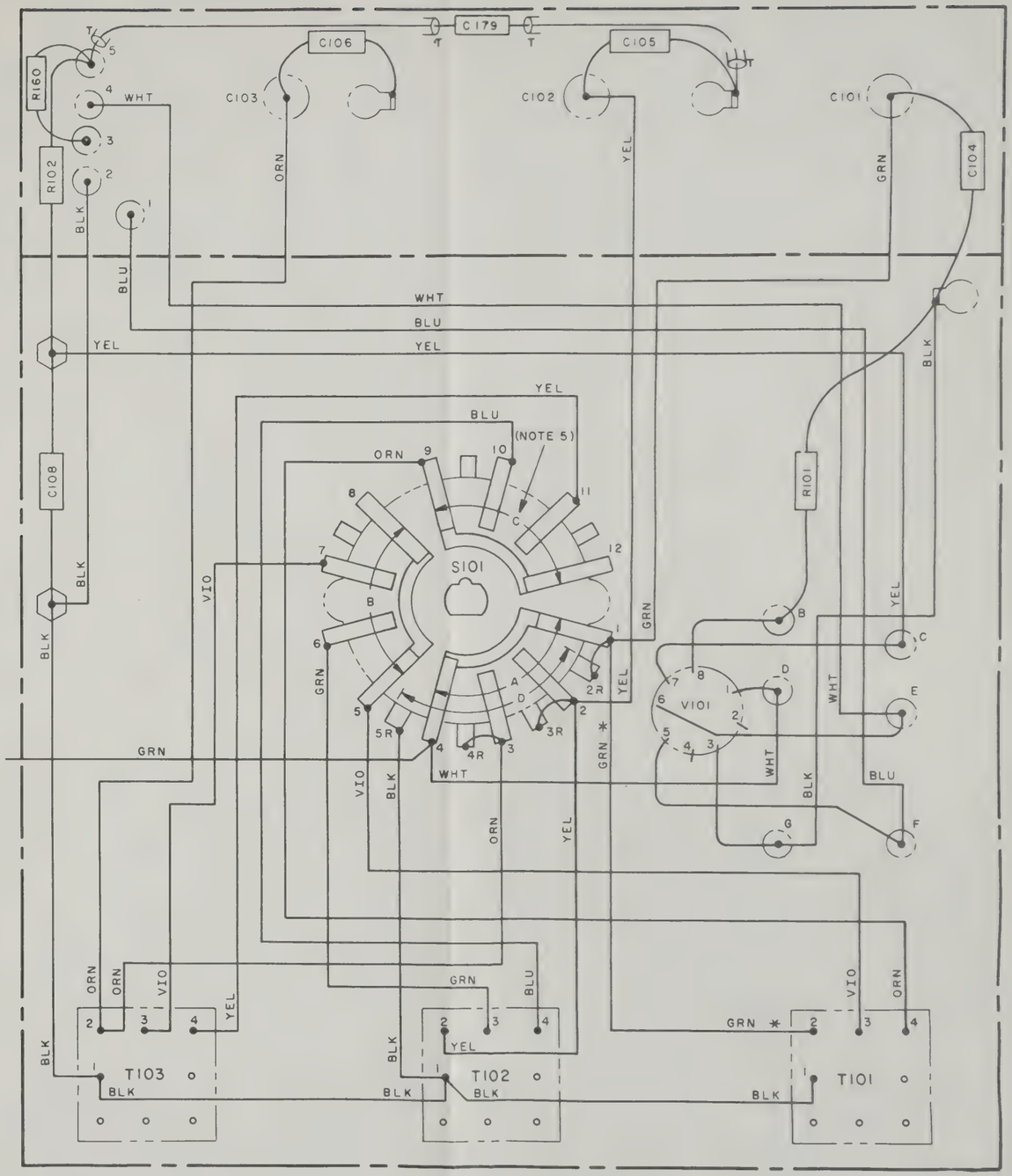
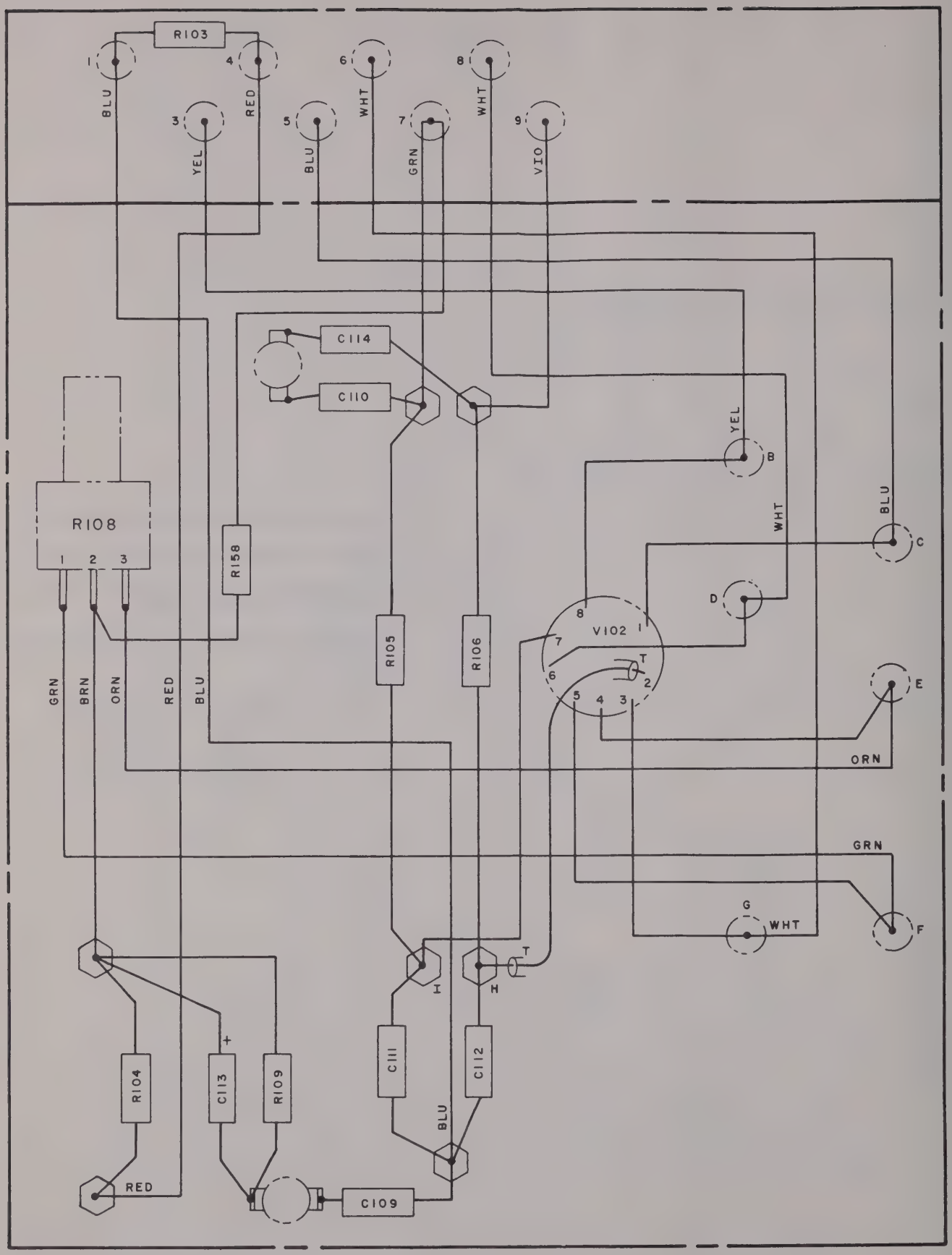


Figure 4-27. Receiver, Loop Amplifier Z101, Wiring Diagram


R103
1
4
6
8
BLU
RED
WHT
WHT
3
5
7
9
YEL
BLU
GRN
VIO
C114
C110
R108
1 2 3
R158
R105
R106
YEL
B
WHT
BLU
C
D
8
V102
1
7
T
6
2
5 4 3
E
GRN
BRN
ORN
RED
BLU
ORN
GRN
G
WHT
F
H
H
T
+
R104
C113
R109
C111
C112
BLU
RED
C109

NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 4-25
2. FOR MAIN CHASSIS WIRING DIAGRAM, SEE FI URE 4-26.
3. WIRES MARKED WITH COLOR NOTE ARE NO. AWG SOLID COPPER, TEFLON INSULATED.
4. UNMARKED WIRES ARE NO. 24 AWG BARE, SOLID, TINNED COPPER.
5. PLASTIC COATED FIBERGLAS TUBING (0.032 INCH I.D.) IS INSTALLED OVER WIRES MARK "T."
6. SWITCH SECTIONS (TERMINAL GROUPS FOR SWITCH SECTIONS IN S102 AND S103) ARE IDENTICAL.

SECTION	TERMINALS
A	1, 2, 3, 4
B	5, 6, 7, 8
C	9, 10, 11, 12
D	2R, 3R, 4R, 5R, 8R, 10R, 12R

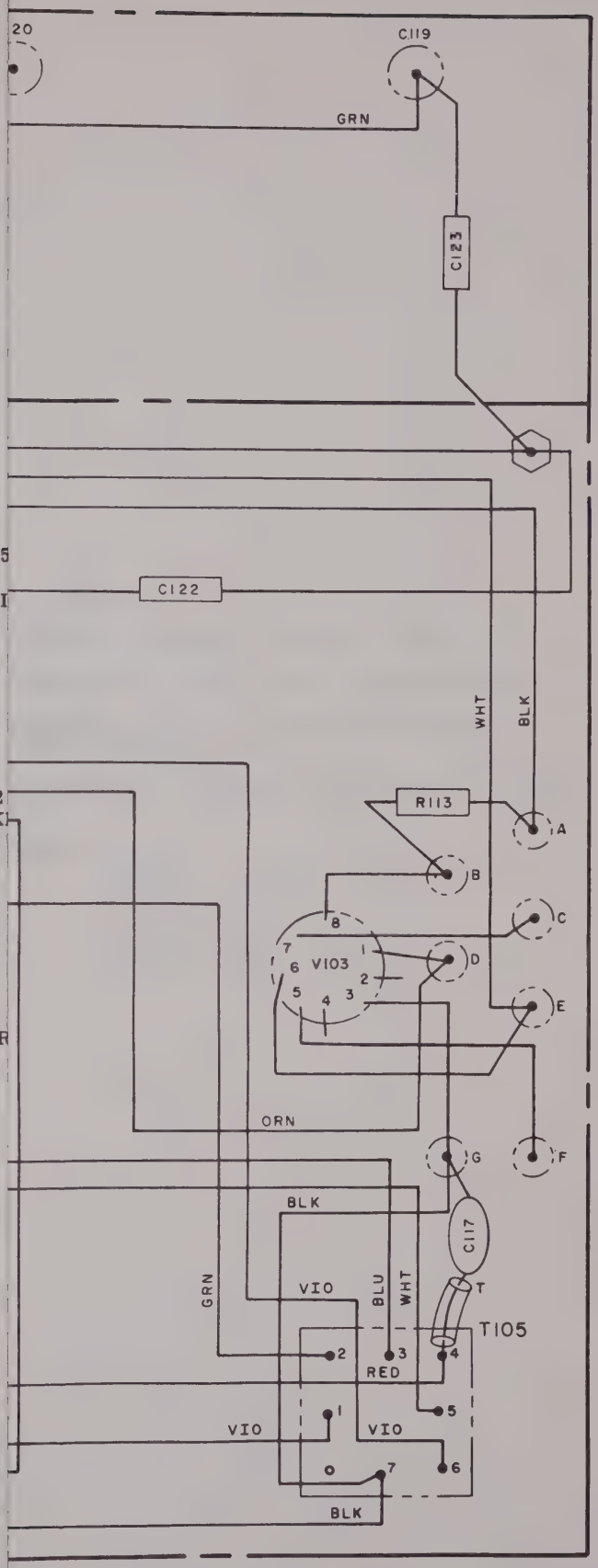


Figure 4-29. Receiver, Antenna Assembly Z103, Wiring Diagram

NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 4-25.
2. FOR MAIN CHASSIS WIRING DIAGRAM, SEE FIGURE 4-26.
3. WIRES MARKED WITH COLOR NOTE ARE NO. 24 AWG SOLID COPPER, TEFLON INSULATED.
4. TEFLON IMPREGNATED FIBERGLAS TUBING (.032 INCH I.D.) IS INSTALLED OVER WIRE MARKED "T."

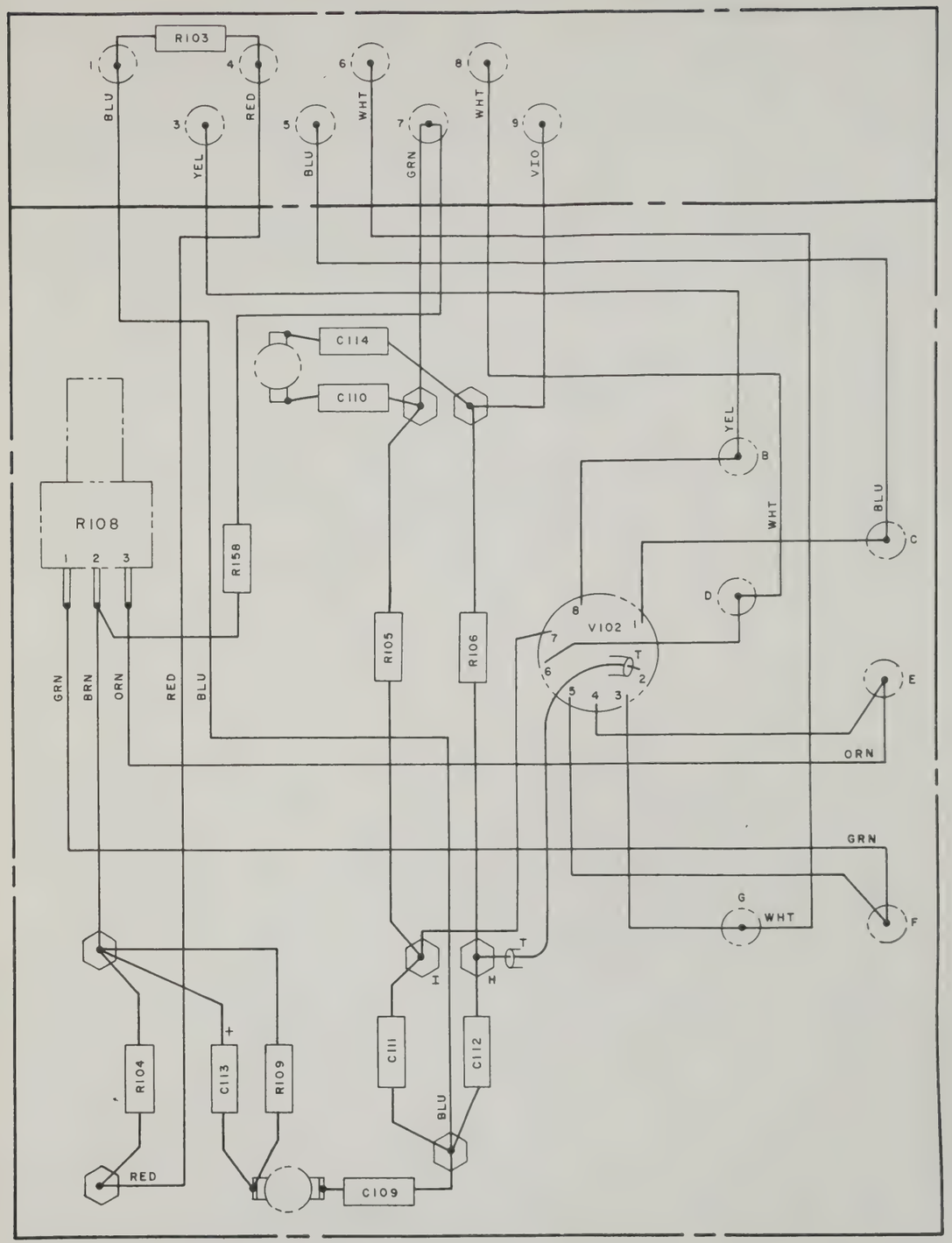
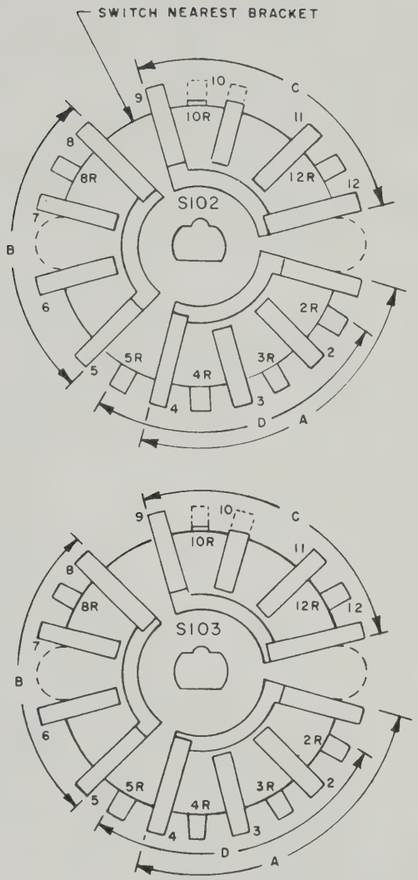


Figure 4-28. Receiver, Modulator Z102, Wiring Diagram

NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 4-25.
2. FOR MAIN CHASSIS WIRING DIAGRAM, SEE FIGURE 4-26.
3. WIRES MARKED WITH COLOR NOTE ARE NO. 24 AWG SOLID COPPER, TEFLON INSULATED.
4. UNMARKED WIRES ARE NO. 24 AWG BARE, SOLID, TINNED COPPER.
5. PLASTIC COATED FIBERGLAS TUBING (0.032 INCH I.D.) IS INSTALLED OVER WIRES MARKED "T."
6. SWITCH SECTIONS (TERMINAL GROUPS FOR SWITCH SECTIONS IN S102 AND S103) ARE IDENTICAL.

SECTION	TERMINALS
A	1, 2, 3, 4
B	5, 6, 7, 8
C	9, 10, 11, 12
D	2R, 3R, 4R, 5R, 8R, 10R, 12R



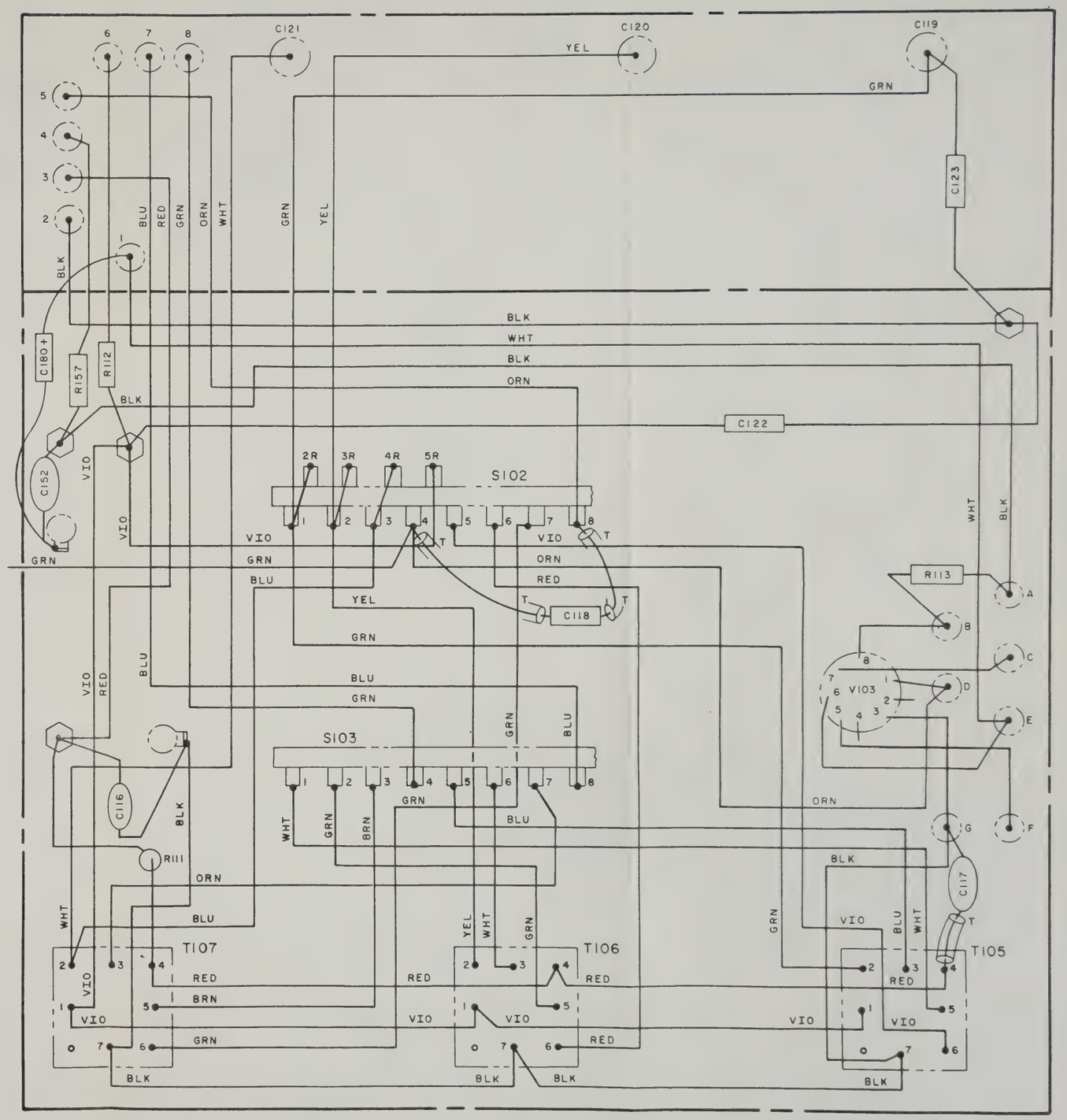
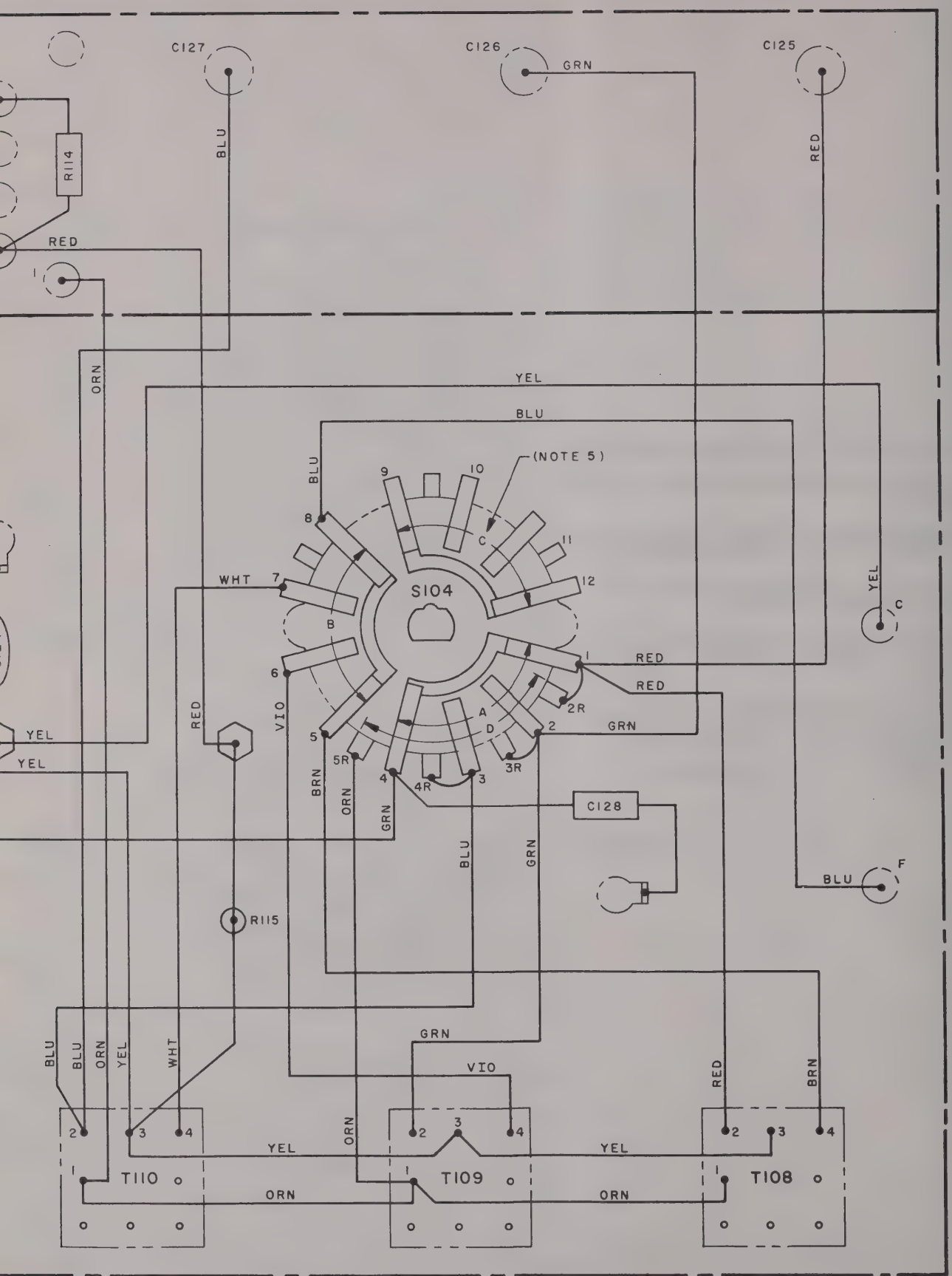


Figure 4-29. Receiver, Antenna Assembly Z103, Wiring Diagram


C127
C126
C125
GRN
BLU
RED
R114
RED
ORN
YEL
BLU
(NOTE 5)
S104
WHT
RED
RED
GRN
YEL
YEL
VIO
BRN
ORN
GRN
BLU
GRN
C128
BLU
F
R115
GRN
VIO
BLU
BLU
ORN
YEL
WHT
RED
BRN
YEL
ORN
YEL
ORN
ORN
T110
T109
T108

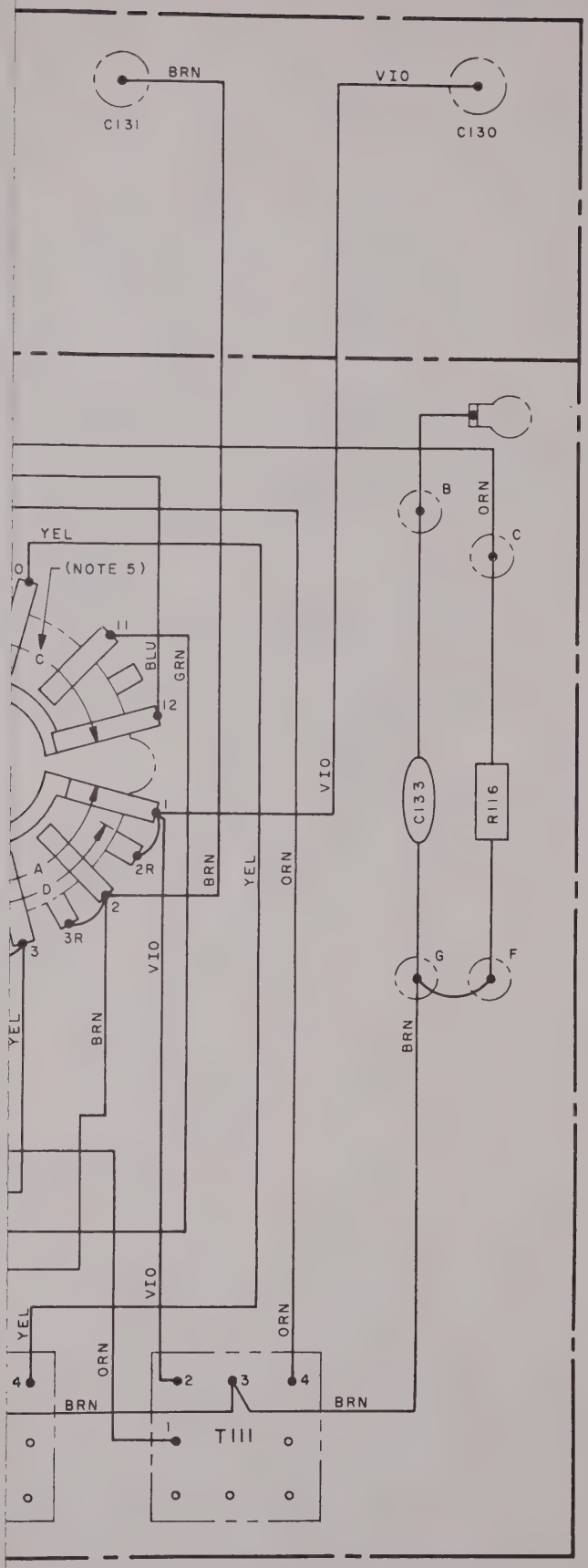


Figure 4-31. Receiver, Second r-f Z105, Wiring Diagram

NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 4-25.
2. FOR MAIN CHASSIS WIRING DIAGRAM, SEE FIGURE 4-26.
3. WIRES MARKED WITH COLOR NOTE ARE NO. 24 AWG SOLID COPPER, TEFLON INSULATED.
4. UNMARKED WIRES ARE NO. 24 AWG BARE, SOLID, TINNED COPPER.
5. SWITCH SECTIONS:

SECTION	TERMINALS
S104A	1, 2, 3, 4
S104B	5, 6, 7, 8
S104C	9, 10, 11, 12
S104D	2R, 3R, 4R, 5R

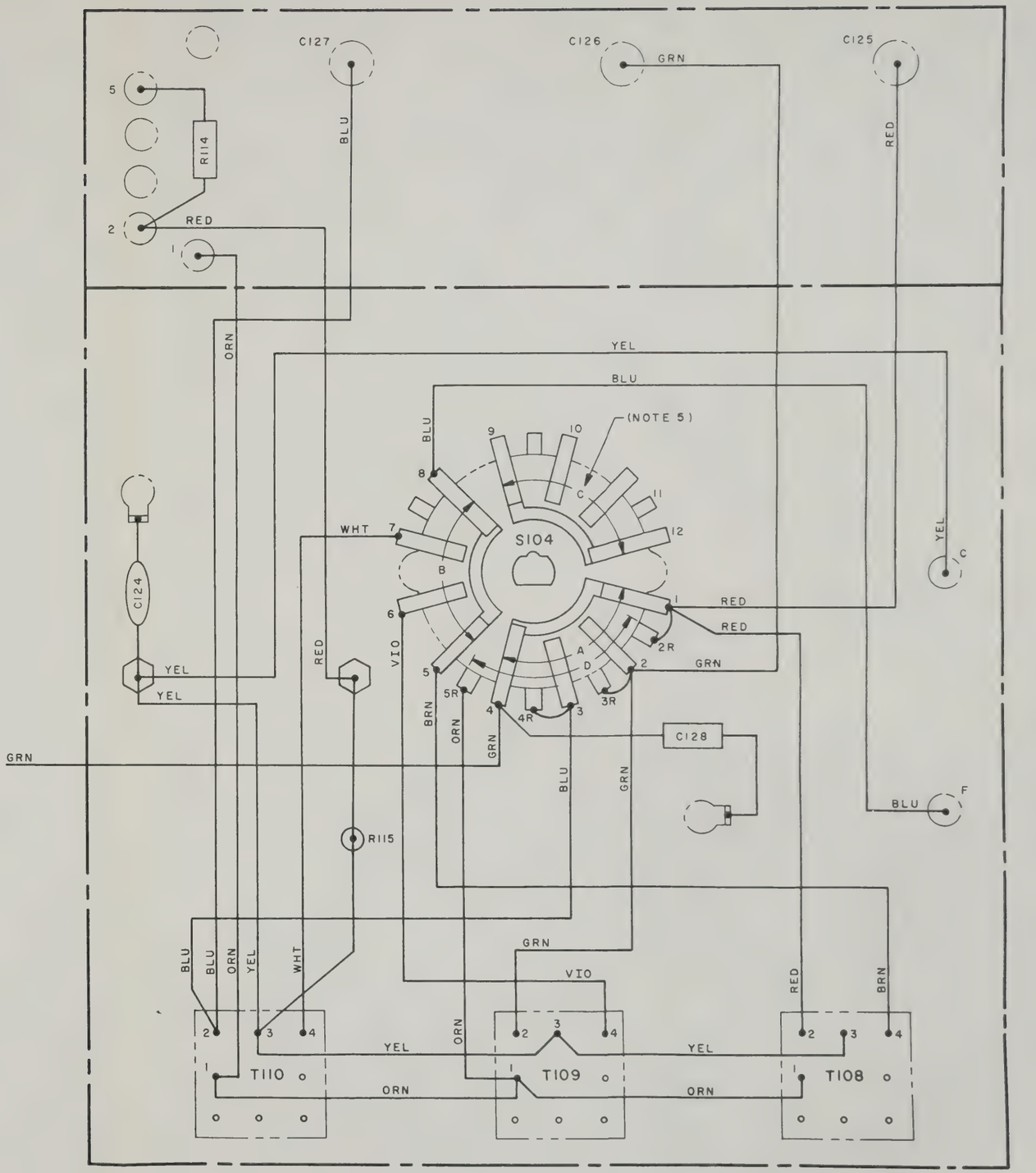


Figure 4-30. Receiver, First r-f Z104, Wiring Diagram

NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 4-25.
2. FOR MAIN CHASSIS WIRING DIAGRAM, SEE FIGURE 4-26.
3. WIRES MARKED WITH COLOR NOTE ARE NO. 24 AWG SOLID COPPER, TEFLON INSULATED.
4. UNMARKED WIRES ARE NO. 24 AWG BARE, SOLID, TINNED COPPER.
5. SWITCH SECTIONS:

SECTION	TERMINALS
S105A	1, 2, 3, 4
S105B	5, 6, 7, 8
S105C	9, 10, 11, 12
S105D	2R, 3R, 4R, 5R

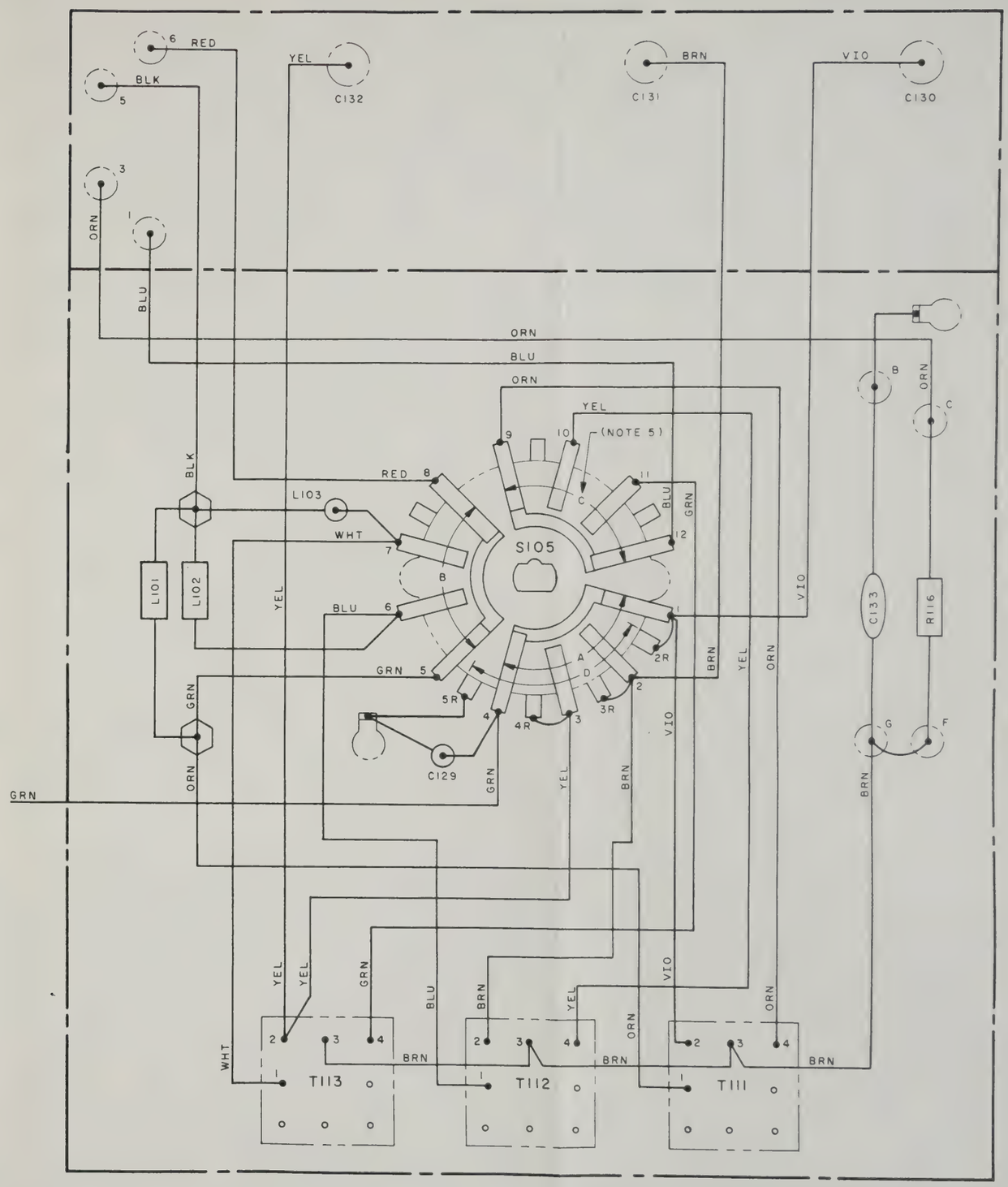
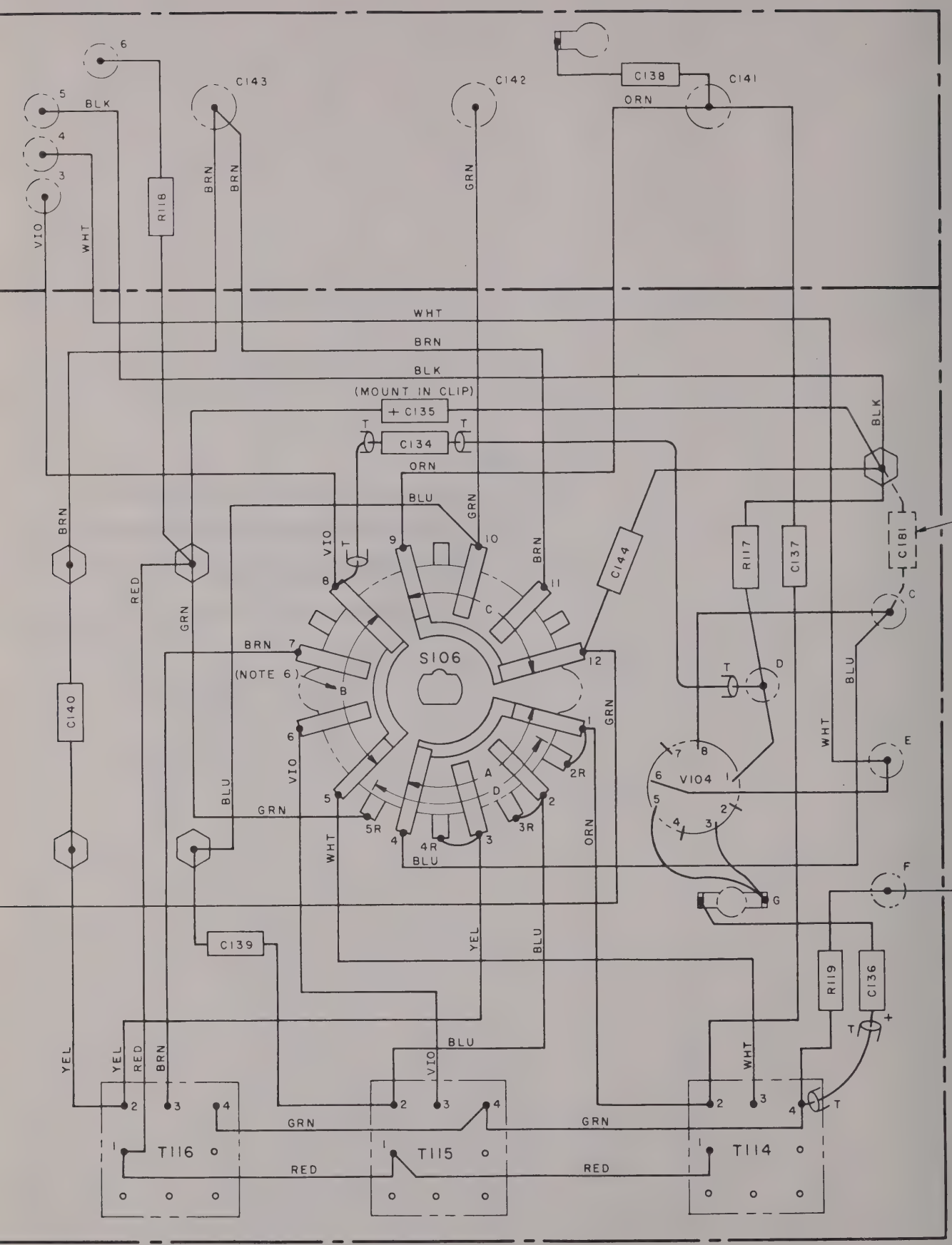
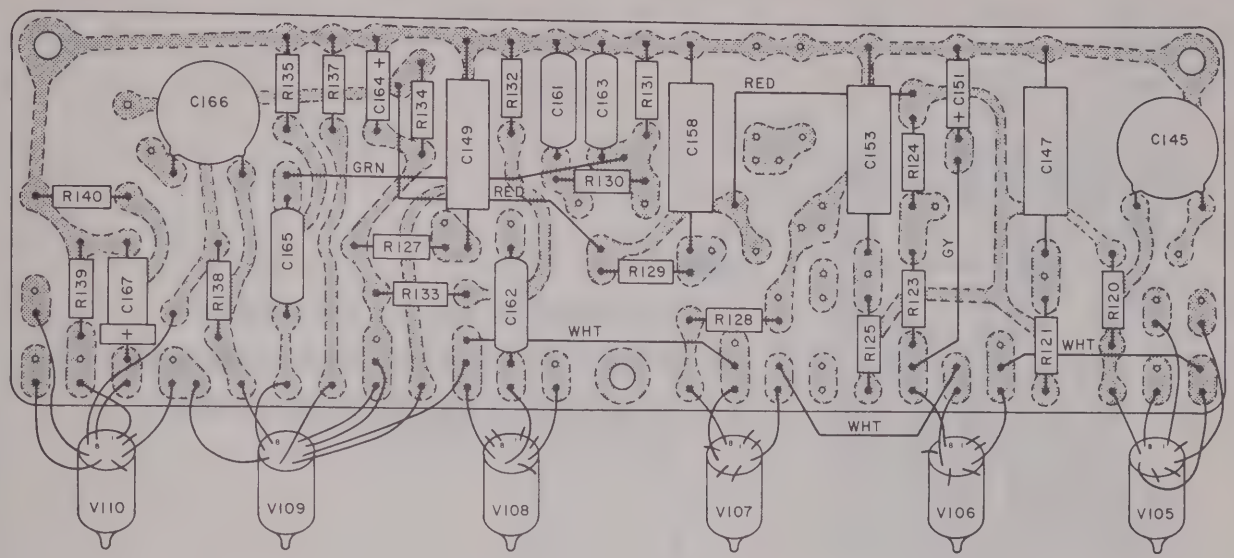


Figure 4-31. Receiver, Second r-f Z105, Wiring Diagram



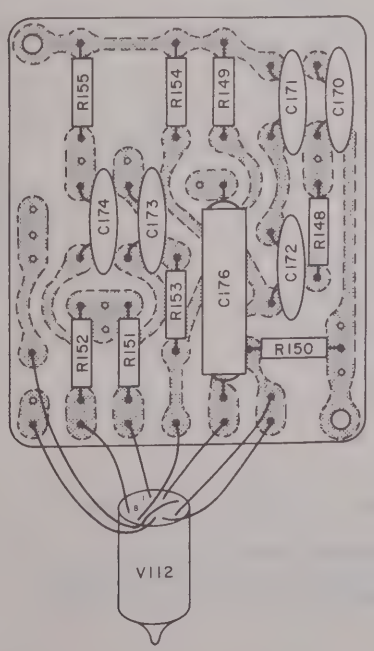
C143
C142
C138
C141
BLK
ORN
R118
BRN
GRN
VIO
WHT
(MOUNT IN CLIP)
+ C135
C134
BLU
C144
R117
C137
C181
(NOTE 6)
S106
C140
V104
C139
R119
C136
YEL
RED
T116
T115
T114



NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 4-25.
2. FOR MAIN CHASSIS WIRING DIAGRAM, SEE FIGURE 4-26.
3. WIRES MARKED WITH COLOR NOTE ARE NO. 24 AWG STRANDED COPPER, TEFLON INSULATED.
4. SHADED AREA DENOTES UNETCHED COPPER ON OPPOSITE SIDE OF BOARD.

Figure 4-33. Receiver, i-f and a-f Amplifier, Wiring Diagram



NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 4-25
2. FOR MAIN CHASSIS WIRING DIAGRAM, SEE FIGURE 4-26.
3. SHADED AREA DENOTES UNETCHED COPPER ON OPPOSITE SIDE OF BOARD.

Figure 4-34. Receiver, 100 cps Amplifier V112, Wiring Diagram

NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 4-25.
2. FOR MAIN CHASSIS WIRING DIAGRAM, SEE FIGURE 4-26.
3. WIRES MARKED WITH COLOR NOTE ARE NO. 24 AWG SOLID COPPER, TEFLON INSULATED.
4. UNMARKED WIRES ARE NO. 24 AWG BARE, SOLID, TINNED COPPER.
5. PLASTIC COATED FIBERGLAS TUBING (0.032 INCH I.D.) IS INSTALLED OVER WIRES MARKED "T."
6. SWITCH SECTIONS:

SECTION	TERMINALS
S106A	1, 2, 3, 4
S106B	5, 6, 7, 8
S106C	9, 10, 11, 12
S106D	2R, 3R, 4R, 5R

7. C181 INSTALLED IN SOME UNITS DURING FINAL FACTORY ADJUSTMENT.

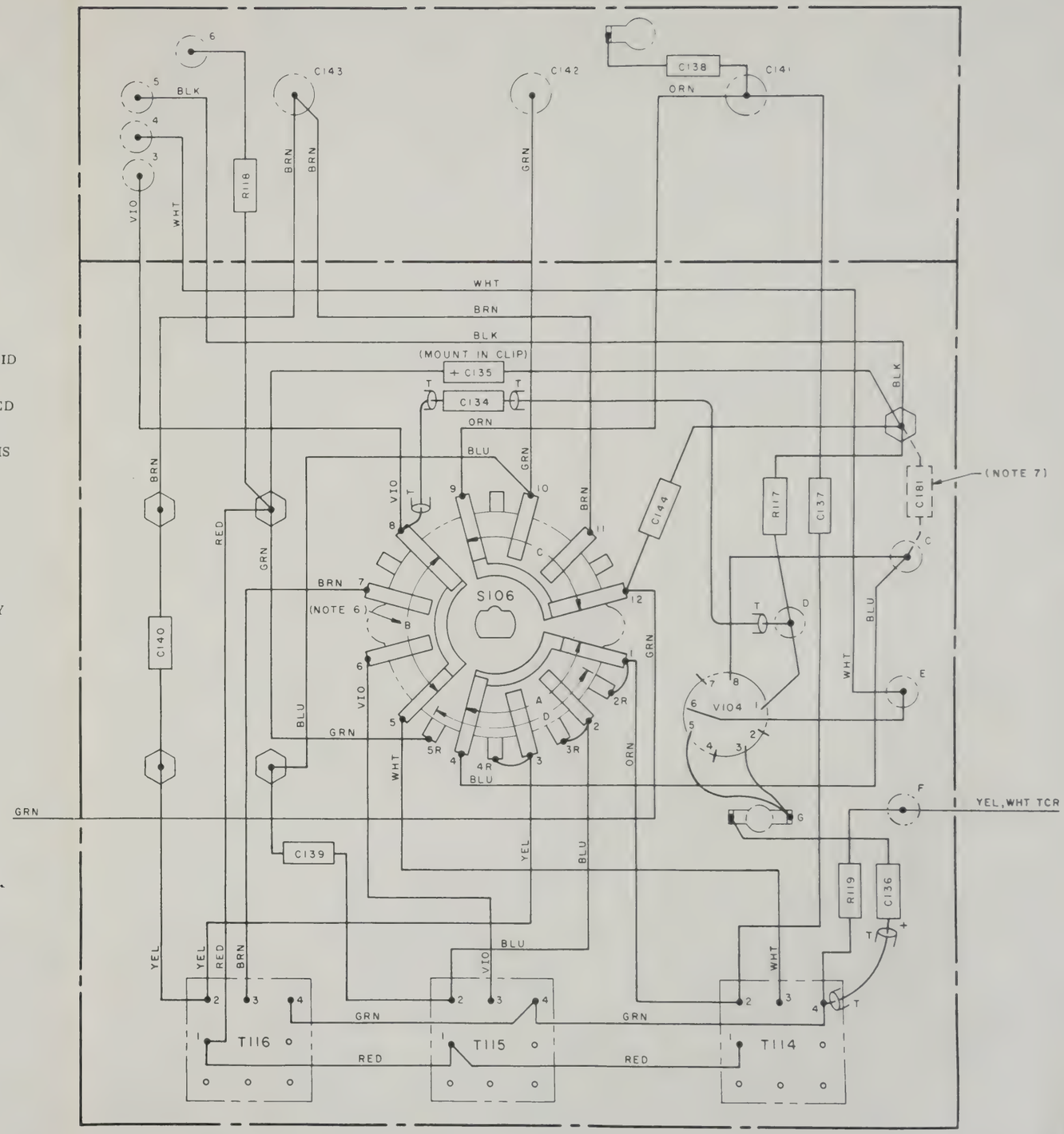
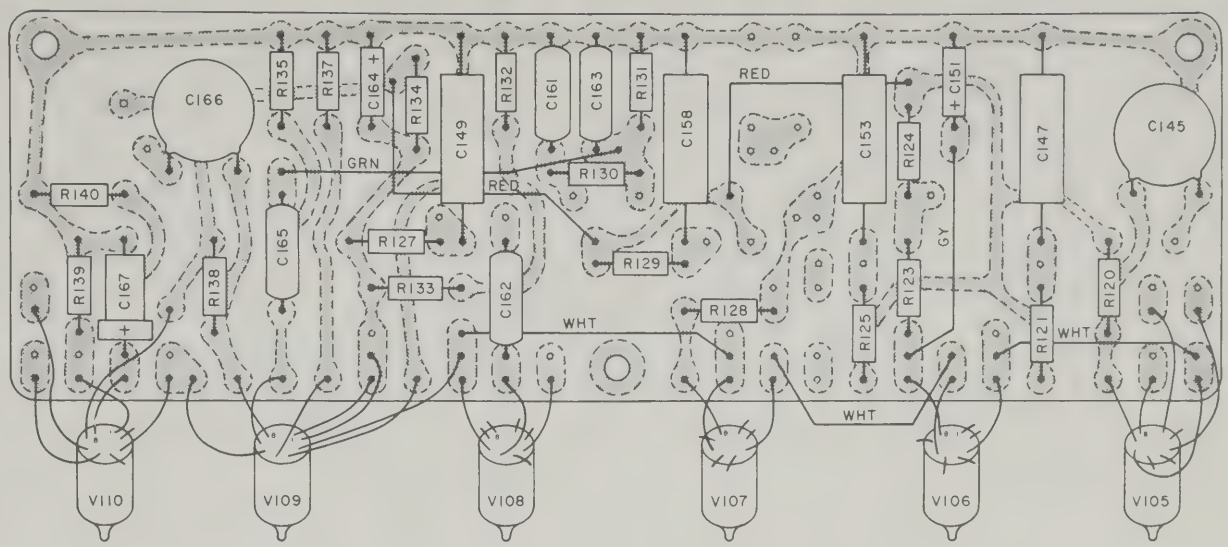


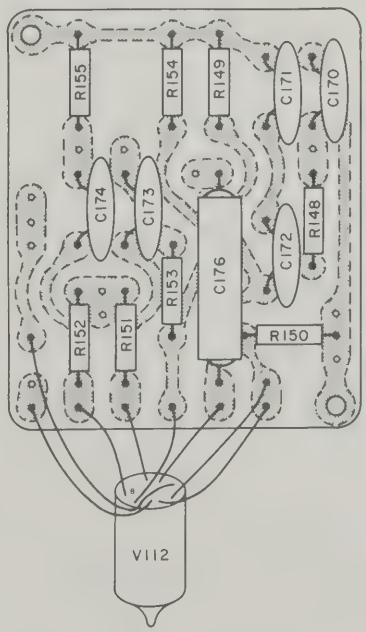
Figure 4-32. Receiver, Oscillator Z106, Wiring Diagram



NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 4-25.
2. FOR MAIN CHASSIS WIRING DIAGRAM, SEE FIGURE 4-26.
3. WIRES MARKED WITH COLOR NOTE ARE NO. 24 AWG STRANDED COPPER, TEFLON INSULATED.
4. SHADED AREA DENOTES UNETCHED COPPER ON OPPOSITE SIDE OF BOARD.

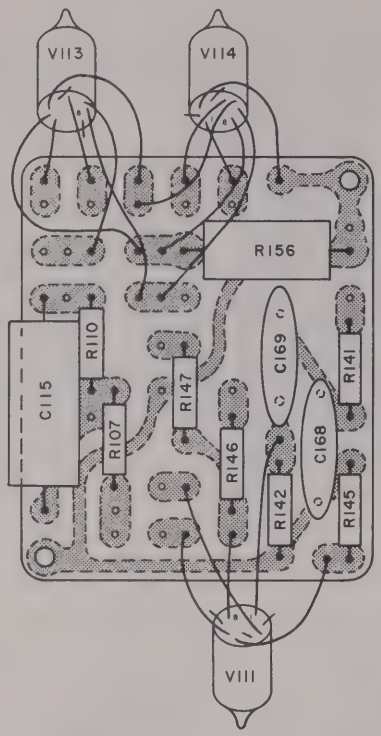
Figure 4-33. Receiver, i-f and a-f Amplifier, Wiring Diagram



NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 4-25
2. FOR MAIN CHASSIS WIRING DIAGRAM, SEE FIGURE 4-26.
3. SHADED AREA DENOTES UNETCHED COPPER ON OPPOSITE SIDE OF BOARD.

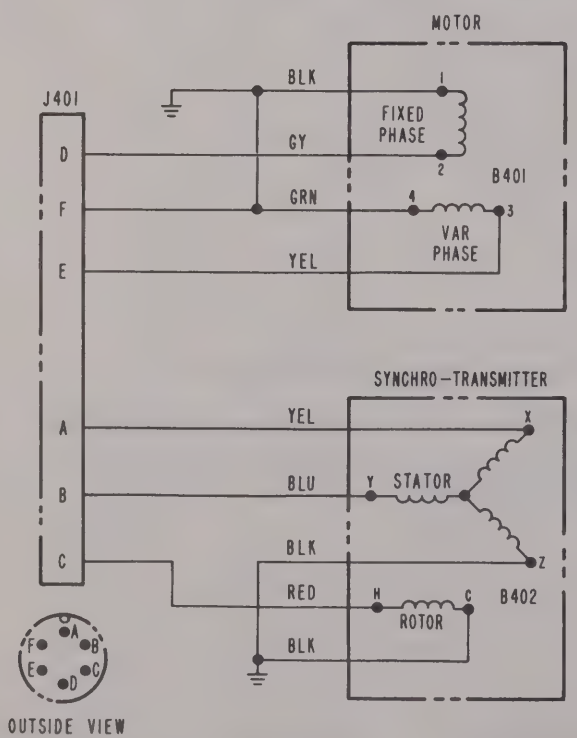
Figure 4-34. Receiver, 100 cps Amplifier V112, Wiring Diagram

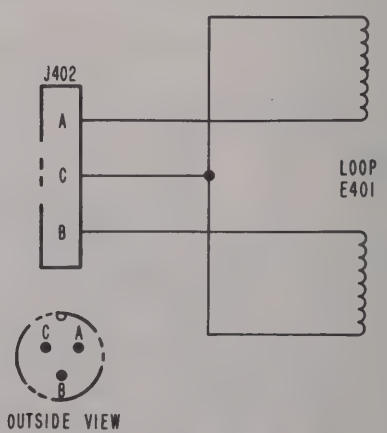


NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 4-25.
2. FOR MAIN CHASSIS WIRING DIAGRAM, SEE FIGURE 4-26.
3. SHADED AREA DENOTES UNETCHED COPPER ON OPPOSITE SIDE OF BOARD.

Figure 4-35. Receiver, 100 cps Amplifiers V111, V113, and V114, Wiring Diagram

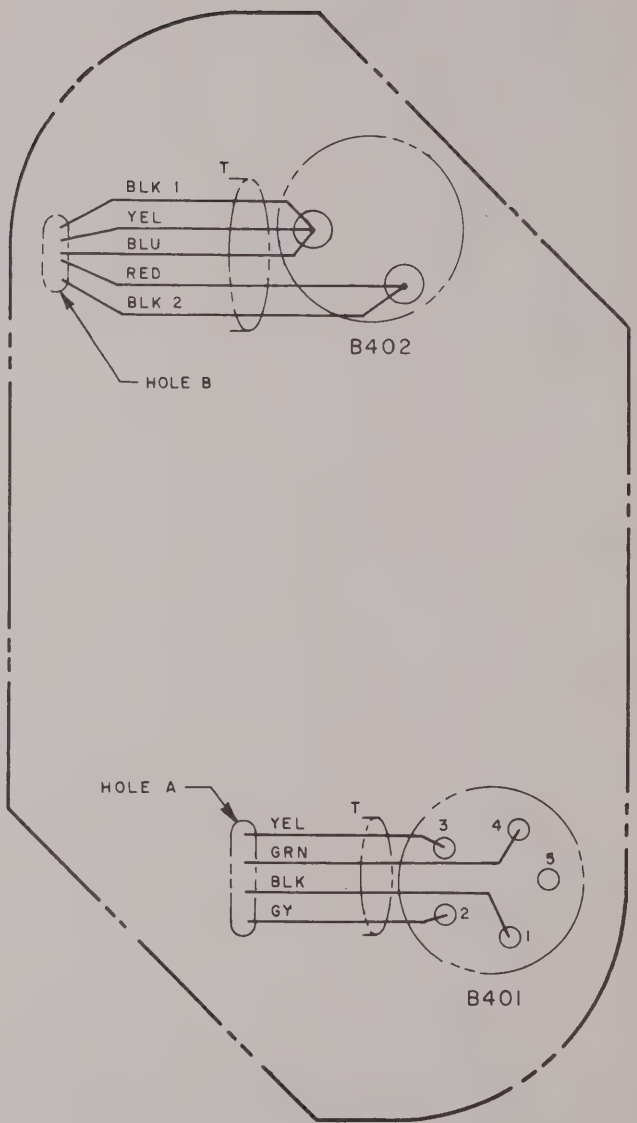




NOTES:

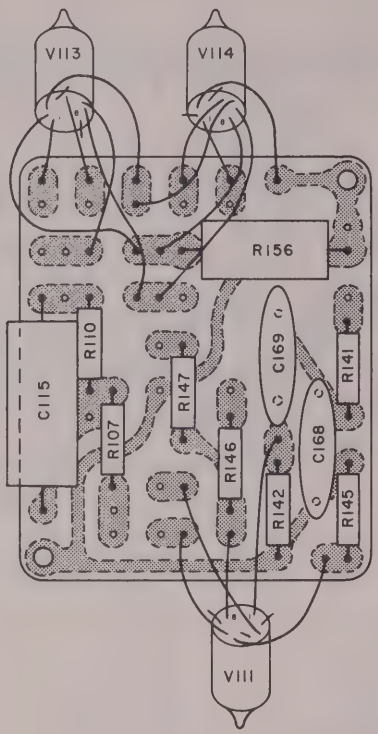
1. FOR WIRING DIAGRAM, SEE FIGURE 4-37.
2. WIRES MARKED WITH COLOR CODE ARE MOTOR AND SYNCHRO LEADS, AND ARE FURNISHED AS PART OF THE UNITS.

Figure 4-36. Loop Antenna, Schematic Diagram



WIRING TO BOTTOM OF GEARING UNIT ASSEMBLY

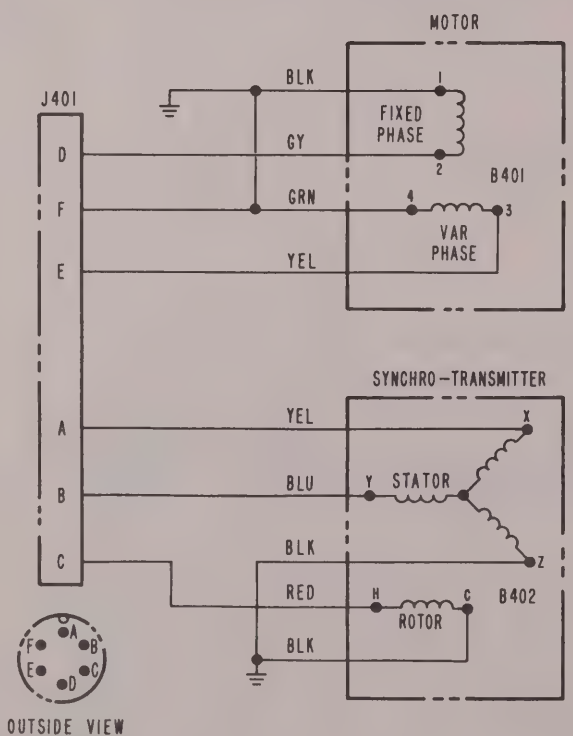
Figure 4-37. Loop Antenna, Wiring Diagram

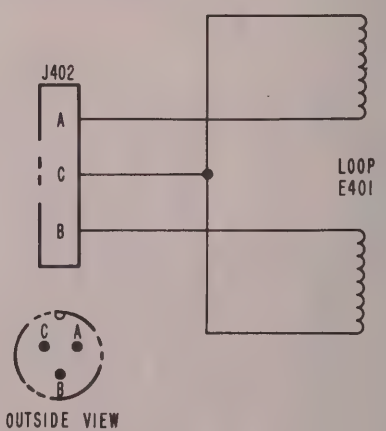


NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 4-25.
2. FOR MAIN CHASSIS WIRING DIAGRAM, SEE FIGURE 4-26.
3. SHADED AREA DENOTES UNETCHED COPPER ON OPPOSITE SIDE OF BOARD.

Figure 4-35. Receiver, 100 cps Amplifiers V111, V113, and V114, Wiring Diagram

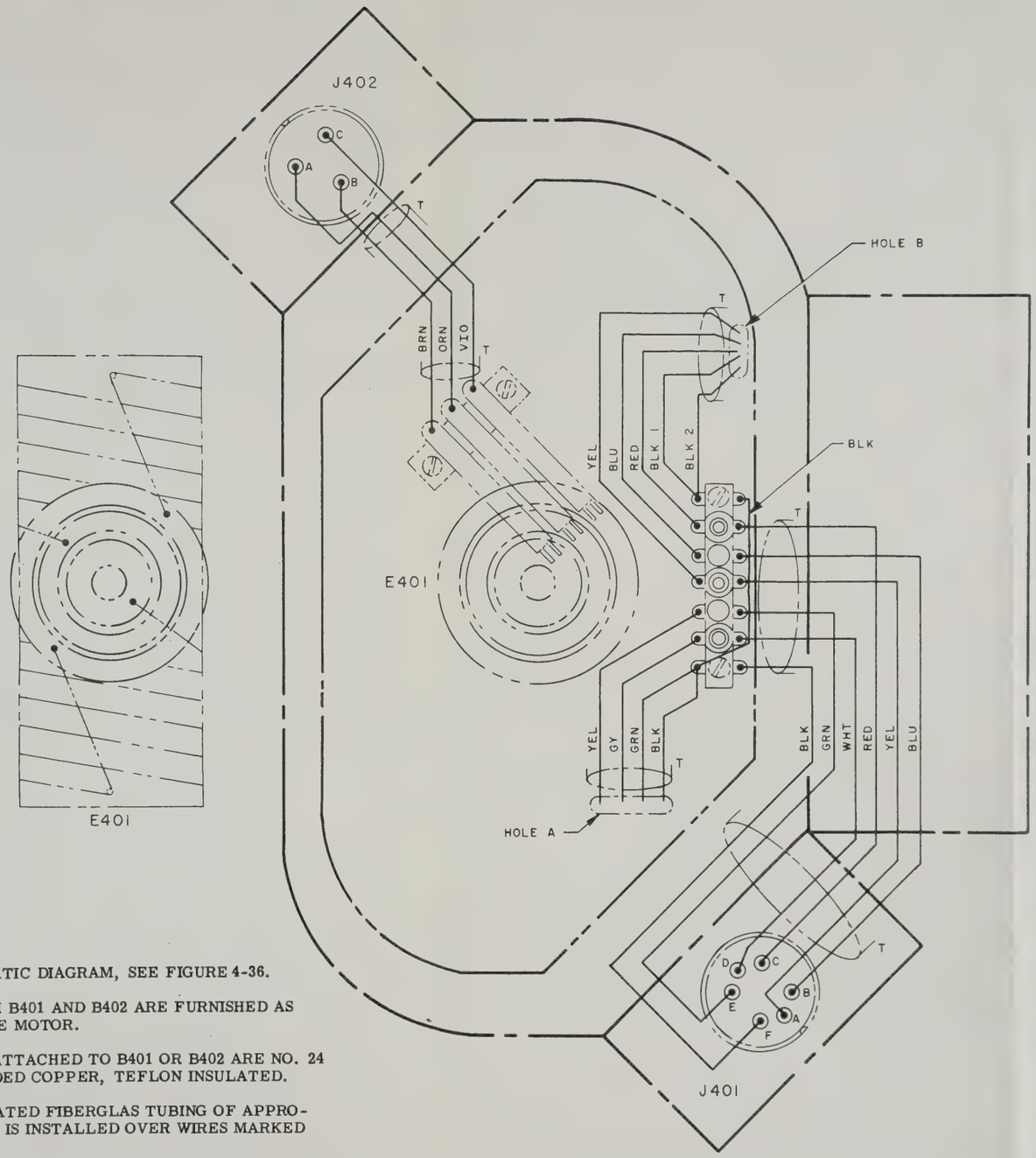




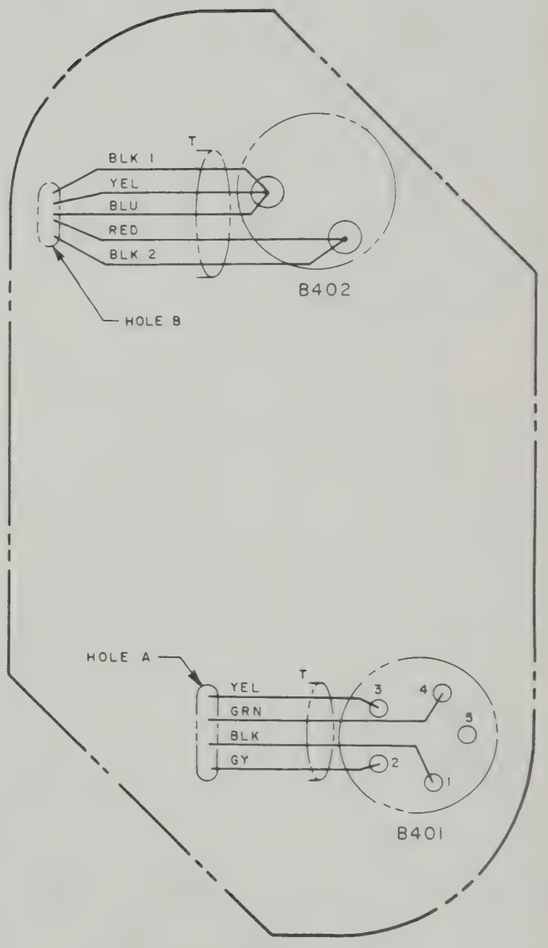
NOTES:

1. FOR WIRING DIAGRAM, SEE FIGURE 4-37.
2. WIRES MARKED WITH COLOR CODE ARE MOTOR AND SYNCHRO LEADS, AND ARE FURNISHED AS PART OF THE UNITS.

Figure 4-36. Loop Antenna, Schematic Diagram



WIRING TO TOP OF GEARING UNIT ASSEMBLY



WIRING TO BOTTOM OF GEARING UNIT ASSEMBLY

NOTES:

1. FOR SCHEMATIC DIAGRAM, SEE FIGURE 4-36.
2. LEADS FROM B401 AND B402 ARE FURNISHED AS PART OF THE MOTOR.
3. WIRES NOT ATTACHED TO B401 OR B402 ARE NO. 24 AWG STRANDED COPPER, TEFLON INSULATED.
4. PLASTIC COATED FIBERGLAS TUBING OF APPROPRIATE SIZE IS INSTALLED OVER WIRES MARKED "T."

Figure 4-37. Loop Antenna, Wiring Diagram

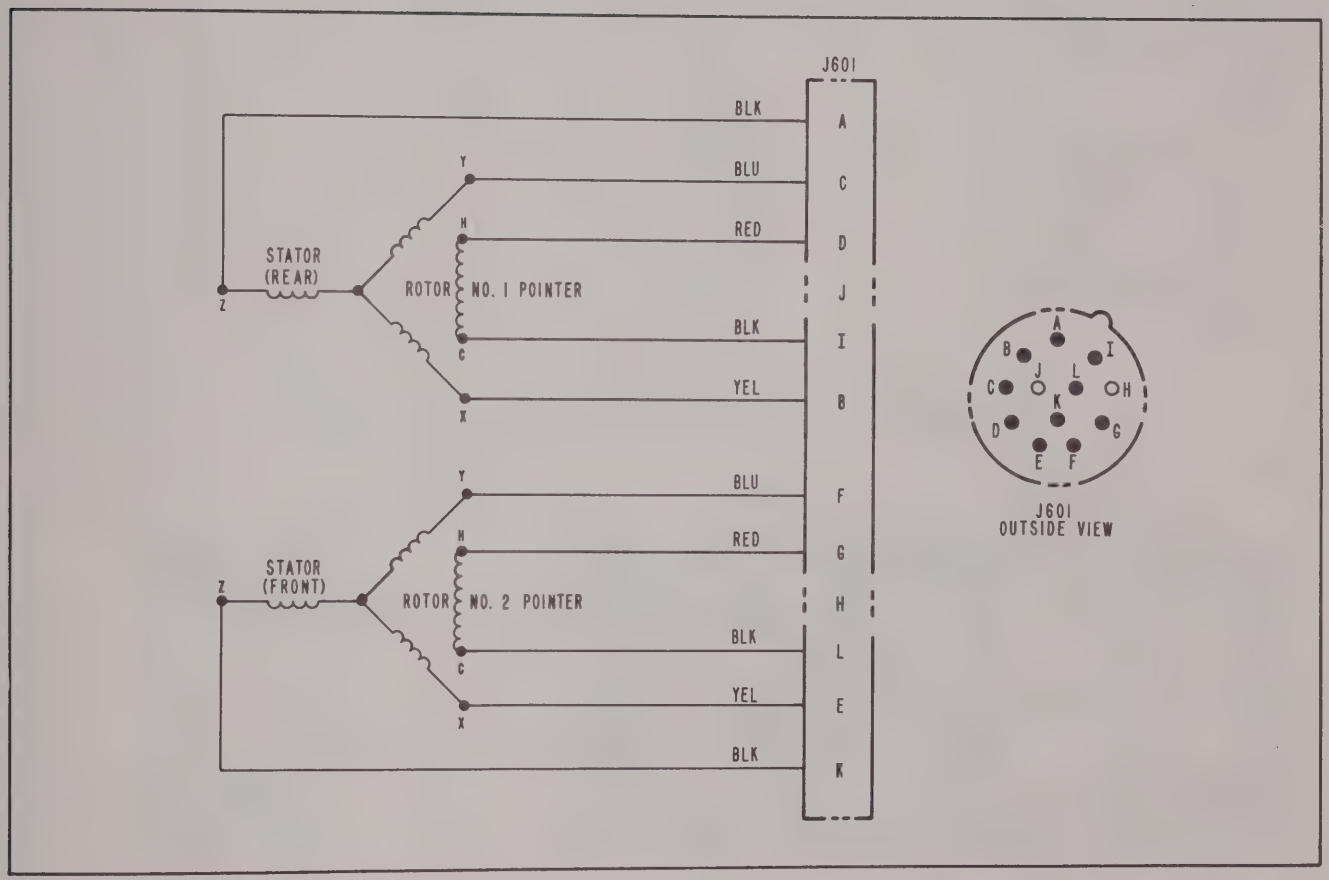


Figure 4-38. 27470 Indicator, Schematic Diagram

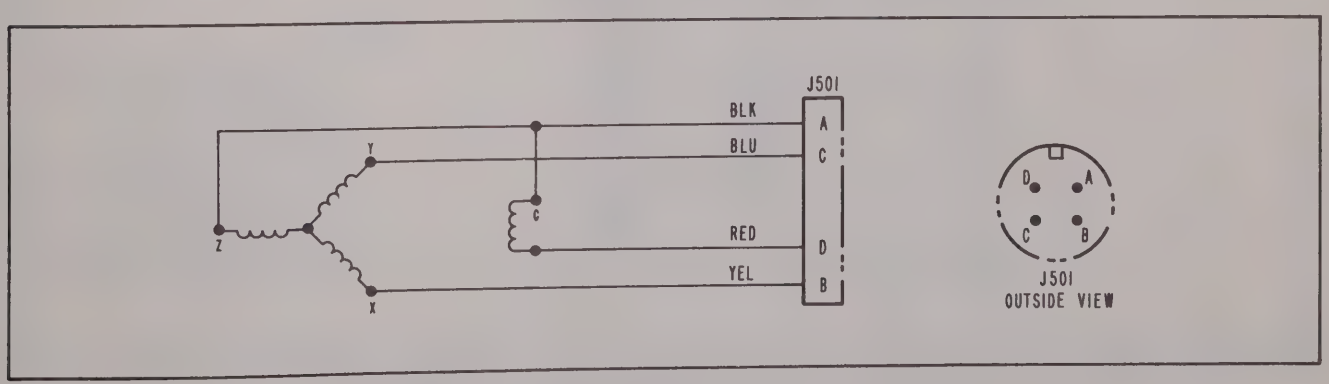


Figure 4-39. 27500 Indicator, Schematic Diagram

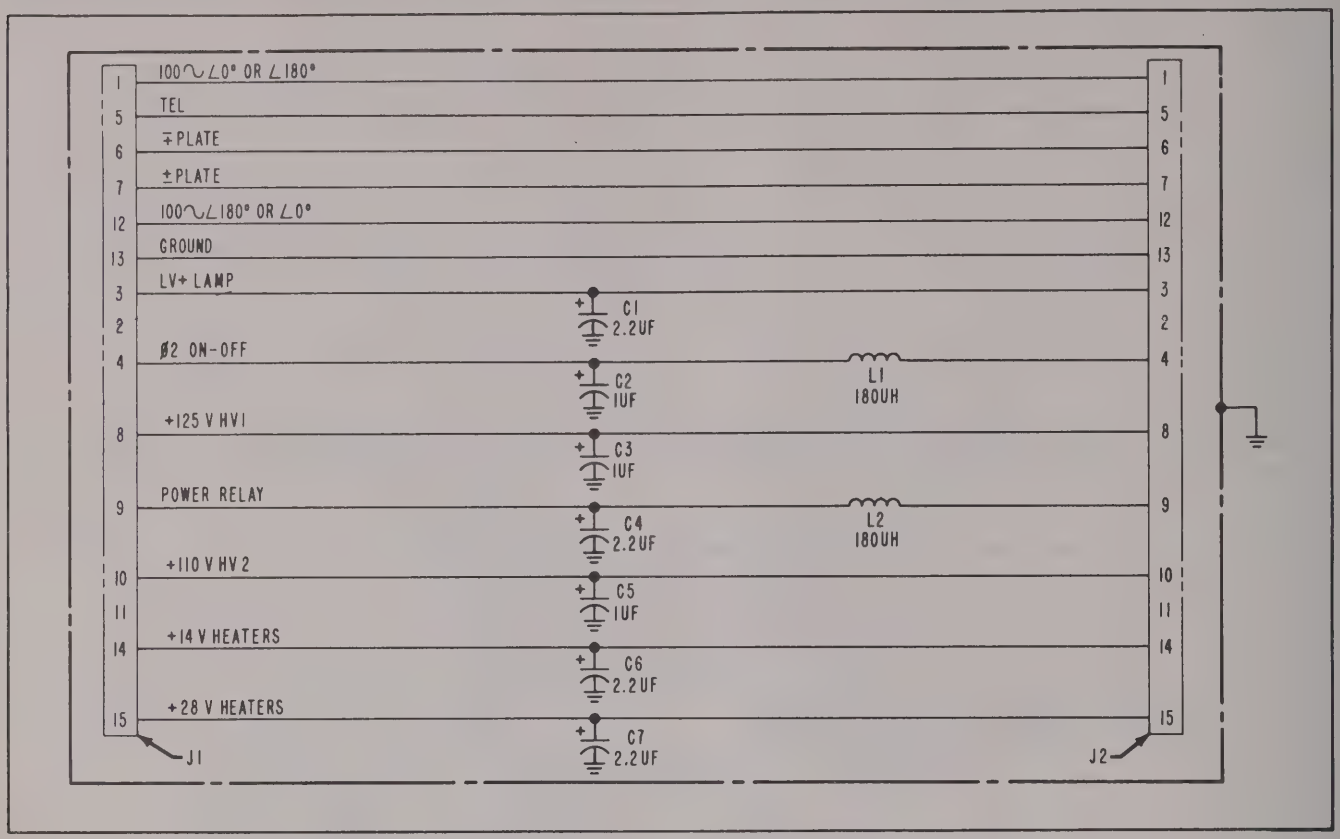


Figure 4-40. Filter Assembly 27859, Schematic Diagram

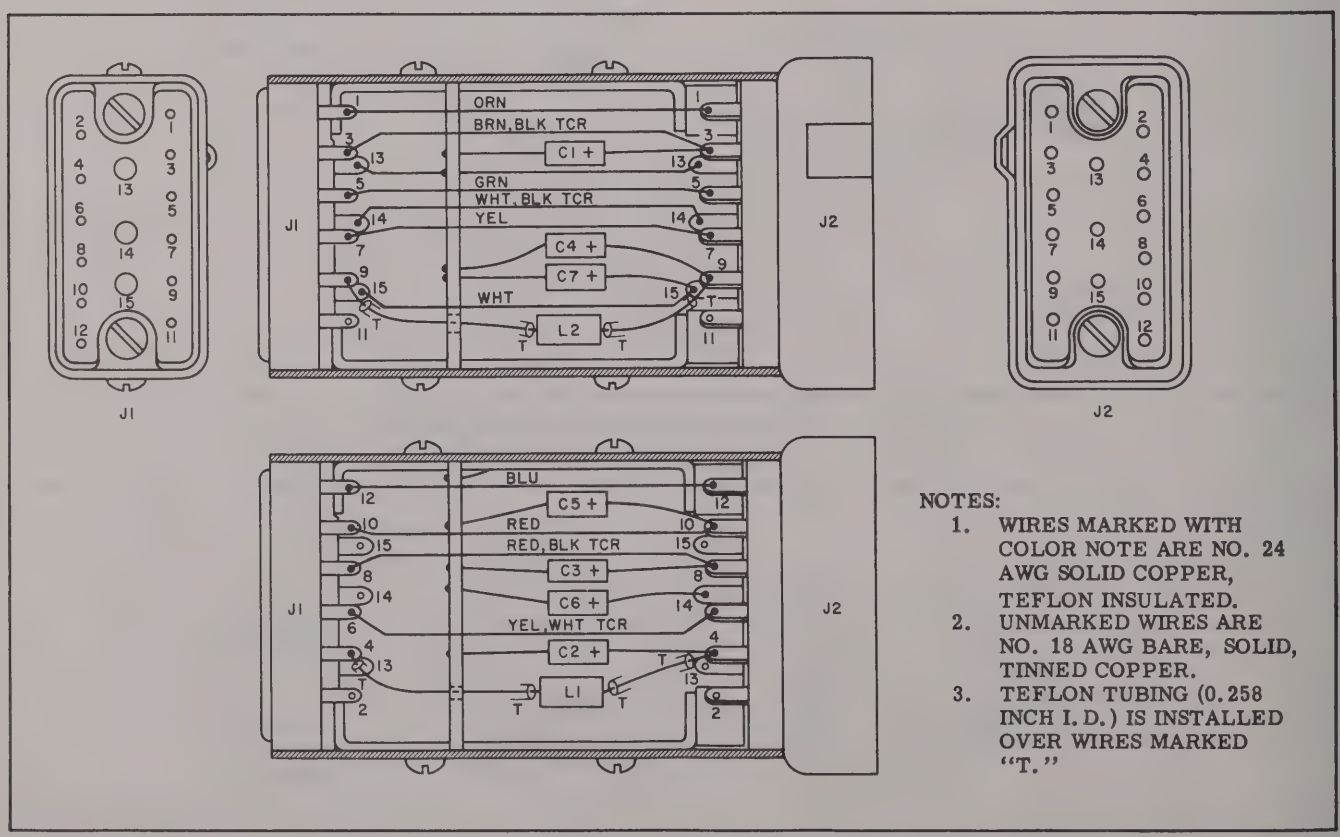
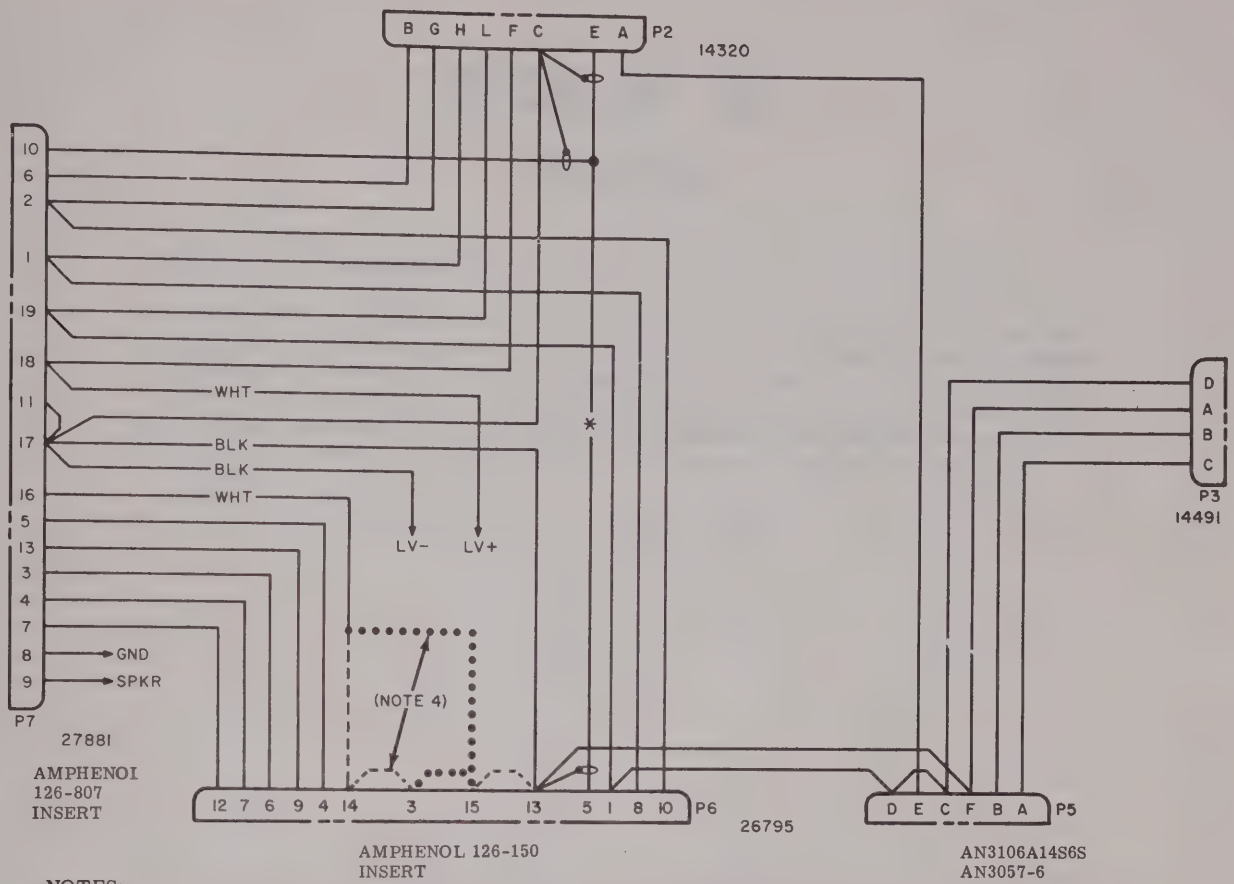


Figure 4-41. Filter Assembly 27859, Wiring Diagram



NOTES:

1. WIRES MARKED WITH COLOR NOTE ARE NO. 16 AWG STRANDED COPPER, VINYLITE INSULATED.
2. WIRE MARKED WITH AN ASTERISK (*) IS NO. 22 AWG STRANDED COPPER, WITH BRAIDED COPPER SHIELD.
3. UNMARKED WIRES ARE NO. 22 AWG STRANDED COPPER, THERMOPLASTIC INSULATED.
4. – – – – – – – – LINES INDICATE CONNECTION FOR 14 VOLT OPERATION.
   • • • • • • • • • • LINES INDICATE CONNECTION FOR 28 VOLT OPERATION.

Figure 4-42. Cable Assembly 28050, Schematic Diagram

DELETED

Figure 4-43.

CESSNA ADF 500

Parts List

This section lists and describes the detail parts of the Cessna ADF 500.

The listings are arranged in two groups: one covering mechanical units and the other covering electronic units. The listings for the mechanical units, arranged in order of disassembly, refer to accompanying exploded view illustrations by figure and index number for visual identification of the listed parts. The listings for the electronic units are arranged in an alphabetical-numerical sequence by the reference designations indicated on the schematic diagram for the unit.

Refer to Section I for parts list of mounting assemblies.

RECEIVER

Reference Designation	Description	Part No.
C101	CAPACITOR, Variable, ceramic, 3 to 12 μμf, 500 vdcw	TS2A-3-NPO
C102	CAPACITOR, Variable, same as C101	
C103	CAPACITOR, Variable, same as C101	
C104	CAPACITOR, Fixed, ceramic, 15 μμf ±5 per cent, 350 vdcw	N1400A15J
C105	CAPACITOR, Fixed, ceramic, 8 μμf ±5 per cent, 350 vdcw	N1400A8J
C106	CAPACITOR, Fixed, ceramic, 5 μμf ±0.5 μμf, 350 vdcw	N1400A5D
C107A-E	CAPACITOR, Variable	25779
C108	CAPACITOR, Fixed, ceramic, 0.022 μf +80 -20 per cent, 500 vdcw	8627-9223
C109	CAPACITOR, Fixed, mica, 150 μμf ±2 per cent, 500 vdcw	CM15D151G
C110	CAPACITOR, Fixed, mica, 510 μμf ±2 per cent, 300 vdcw	CM15D511G
C111	CAPACITOR, Fixed, ceramic, 100 μμf ±5 per cent, 500 vdcw	308
C112	CAPACITOR, Fixed, same as C111	
C113	CAPACITOR, Fixed, electrolytic, 1 μf ±20 per cent, 35 vdcw	150D105X0035A2
C114	CAPACITOR, Fixed, same as C110	
C115	CAPACITOR, Fixed, plastic, 0.1 μf ±5 per cent, 50 vdcw	TWMA1P1-5-5
C116	CAPACITOR, Fixed, same as C108	
C117	CAPACITOR, Fixed, same as C108	
C118	CAPACITOR, Fixed, ceramic, 7 μμf ±0.5 μμf, 350 vdcw	N1400A7D
C119	CAPACITOR, Variable, same as C101	
C120	CAPACITOR, Variable, same as C101	
C121	CAPACITOR, Variable, same as C101	
C122	CAPACITOR, Fixed, paper, 0.047 μf ±20 per cent, 200 vdcw	196P47302S4
C123	CAPACITOR, Fixed, same as C106	
C124	CAPACITOR, Fixed, same as C108	
C125	CAPACITOR, Variable, same as C101	
C126	CAPACITOR, Variable, same as C101	
C127	CAPACITOR, Variable, same as C101	
C128	CAPACITOR, Fixed, ceramic, 22 μμf ±5 per cent, 500 vdcw	8769-0220
C129	CAPACITOR, Fixed, ceramic, 20 μμf ±5 per cent, 500 vdcw	8769-0200
C130	CAPACITOR, Variable, same as C101	
C131	CAPACITOR, Variable, same as C101	
C132	CAPACITOR, Variable, same as C101	
C133	CAPACITOR, Fixed, same as C108	
C134	CAPACITOR, Fixed, mica, 220 μμf ±2 per cent, 500 vdcw	CM15D221G
C135	CAPACITOR, Fixed, electrolytic, 2 μf ±20 per cent, 150 vdcw	110D205X0150G
C136	CAPACITOR, Fixed, same as C113	
C137	CAPACITOR, Fixed, mica, 369 μμf ±1 per cent, cent, 500 vdcw	VTCM20-369F
C138	CAPACITOR, Fixed, ceramic, 8 μμf ±0.25 μμf, 500 vdcw	8769-9801

RECEIVER - Continued

Reference Designation	Description	Part No.
C139	CAPACITOR, Fixed, mica, 745 μμf ±1 per cent, 500 vdcw	VTCM20-745F
C140	CAPACITOR, Fixed, mica, 1740 μμf ±2 per cent, 500 vdcw	VTCM35-1740G
C141	CAPACITOR, Fixed, same as C101	
C142	CAPACITOR, Fixed, same as C101	
C143	CAPACITOR, Fixed, same as C101	
C144	CAPACITOR, Fixed, ceramic, 12 μμf ±5 per cent, 350 vdcw	N1400A12J
C145	CAPACITOR, Fixed, same as C108	
[1] C146	CAPACITOR, Fixed, mica, 510 μμf ±2 per cent, 500 vdcw (p/o Z107 ARC-18171)	VTCM20-510G
C147	CAPACITOR, Fixed, paper, 0.068 μf ±20 per cent, 200 vdcw	118P68302S4
[1] C148	CAPACITOR, Fixed, ceramic, 8.5 μμf ±0.5 μμf (p/o Z107 ARC-18171)	9045
C149	CAPACITOR, Fixed, same as C147	
[1] C150	CAPACITOR, Fixed, same as C148	
C151	CAPACITOR, Fixed, same as C113	
C152	CAPACITOR, Fixed, same as C108	
C153	CAPACITOR, Fixed, same as C147	
[1] C154	CAPACITOR, Fixed, same as C146	
[1] C155	CAPACITOR, Fixed, same as C148	
[1] C156	CAPACITOR, Fixed, same as C146	
[1] C157	CAPACITOR, Fixed, same as C146	
C158	CAPACITOR, Fixed, same as C147	
[1] C159	CAPACITOR, Fixed, same as C148	
[1] C160	CAPACITOR, Fixed, same as C146	
C161	CAPACITOR, Fixed, same as C110	
C162	CAPACITOR, Fixed, same as C134	
C163	CAPACITOR, Fixed, same as C110	
C164	CAPACITOR, Fixed, same as C113	
C165	CAPACITOR, Fixed, mica, 330 μμf ±2 per cent, 500 vdcw	VTCM15-331G
C166	CAPACITOR, Fixed, same as C108	
C167	CAPACITOR, Fixed, electrolytic, 10 μf +50 -15 per cent, 25 vdcw	PP10B25A2
C168	CAPACITOR, Fixed, ceramic, 0.01 μf ±20 per cent, 1000 vdcw	36C233
C169	CAPACITOR, Fixed, same as C168	
C170	CAPACITOR, Fixed, same as C168	
C171	CAPACITOR, Fixed, same as C168	
C172	CAPACITOR, Fixed, same as C168	
C173	CAPACITOR, Fixed, same as C168	
C174	CAPACITOR, Fixed, same as C168	
C175	NOT USED	
C176	CAPACITOR, Fixed, plastic, 0.01 μf ±20 per cent, 300 vdcw	TWA3S1-10
C177	CAPACITOR, Fixed, mica, 3300 μμf ±5 per cent, 500 vdcw	VTDM20-3300G
C178	CAPACITOR, Fixed, ceramic, 10 μμf ±0.25 μμf, 500 vdcw	8765-0100
C179	CAPACITOR, Fixed, paper, 0.1 μf ±20 per cent, 100 vdcw	196P10401S4
C180	CAPACITOR, Fixed, same as C113	
C181	CAPACITOR, Fixed, ceramic (value selected at time of final adjustment)	8769

[1] Nonprocurable part shown for reference only.

RECEIVER - Continued

Reference Designation	Description	Part No.
DS101	LAMP, Incandescent, T-1-3/4 bulb, miniature bayonet base	313R
J102	CONNECTOR, Receptacle, electrical	5075
L101	CHOKE, RF, 39 μh ±10 per cent	2890-34
L102	CHOKE, RF, 3 μh ±10 per cent	10100-652
L103	CHOKE, RF, 1 μh ±20 per cent	10100-630
L104	REACTOR, 1.5 h	L-1688
M101	MILLIAMMETER	104
P1	CONNECTOR ASSEMBLY	26195
P2	CONNECTOR ASSEMBLY	126-152
R101	RESISTOR, Fixed, comp, 470 ohms ±5 per cent, 1/2w	EB4715
R102	RESISTOR, Fixed, comp, 120,000 ohms ±5 per cent, 1/2w	EB1245
R103	RESISTOR, Fixed, comp, 47,000 ohms ±5 per cent, 1/2w	EB4735
R104	RESISTOR, Fixed, comp, 1 megohm ±5 per cent, 1/2w	EB1055
R105	RESISTOR, Fixed, comp, 330,000 ohms ±5 per cent, 1/2w	EB3345
R106	RESISTOR, Fixed, same as R105	
R107	RESISTOR, Fixed, comp, 100,000 ohms ±5 per cent, 1/2w	EB1045
R108	RESISTOR, Variable, comp, 10,000 ohms ±20 per cent, 0.5w	GLU1042SD3028L
R109	RESISTOR, Fixed, comp, 22,000 ohms ±5 per cent, 1/2w	EB2235
R110	RESISTOR, Fixed, same as R103	
R111	RESISTOR, Fixed, comp, 10,000 ohms ±5 per cent, 1/2w	EB1035
R112	RESISTOR, Fixed, same as R107	
R113	RESISTOR, Fixed, same as R101	
R114	RESISTOR, Fixed, same as R107	
R115	RESISTOR, Fixed, comp, 4700 ohms ±5 per cent, 1/2w	EB4725
R116	RESISTOR, Fixed, same as R107	
R117	RESISTOR, Fixed, same as R107	
R118	RESISTOR, Fixed, same as R111	
R119	RESISTOR, Fixed, comp, 2200 ohms ±5 per cent, 1/2w	EB2225
R120	RESISTOR, Fixed, comp, 220,000 ohms ±5 per cent, 1/2w	EB2245
R121	RESISTOR, Fixed, same as R101	
[1] R122	RESISTOR, Fixed, comp, 220,000 ohms ±10 per cent, 1/5w (p/o Z107 ARC-18171)	997A223K
R123	RESISTOR, Fixed, comp, 120 ohms ±5 per cent, 1/2w	EB1215
R124	RESISTOR, Fixed, comp, 390,000 ohms ±5 per cent, 1/2w	EB3945
R125	RESISTOR, Fixed, same as R119	
[1] R126	RESISTOR, Fixed, same as R122	
R127	RESISTOR, Fixed, same as R104	
R128	RESISTOR, Fixed, comp, 330 ohms ±5 per cent, 1/2w	EB3315

[1] Nonprocurable part shown for reference only.

RECEIVER - Continued

Reference Designation	Description	Part No.
R129	RESISTOR, Fixed, same as R115	
R130	RESISTOR, Fixed, same as R107	
R131	RESISTOR, Fixed, same as R105	
R132	RESISTOR, Fixed, same as R120	
R133	RESISTOR, Fixed, same as R120	
R134	RESISTOR, Fixed, comp, 1.5 megohms ±5 per cent, 1/2w	EB1555
R135	RESISTOR, Fixed, comp, 470,000 ohms ±5 per cent, 1/2w	EB4745
R136	NOT USED	
R137	RESISTOR, Fixed, comp, 1000 ohms ±5 per cent, 1/2w	EB1025
R138	RESISTOR, Fixed, same as R109	
R139	RESISTOR, Fixed, same as R135	
R140	RESISTOR, Fixed, same as R128	
R141	RESISTOR, Fixed, comp, 510,000 ohms ±5 per cent, 1/2w	EB5145
R142	RESISTOR, Fixed, same as R141	
R143	NOT USED	
R144	NOT USED	
R145	RESISTOR, Fixed, comp, 2700 ohms ±5 per cent, 1/2w	EB2725
R146	RESISTOR, Fixed, same as R107	
R147	RESISTOR, Fixed, same as R107	
R148	RESISTOR, Fixed, same as R107	
R149	RESISTOR, Fixed, same as R135	
R150	RESISTOR, Fixed, same as R145	
R151	RESISTOR, Fixed, same as R107	
R152	RESISTOR, Fixed, same as R107	
R153	RESISTOR, Fixed, same as R141	
R154	RESISTOR, Fixed, comp, 30,000 ohms ±5 per cent, 1/2w	EB3035
R155	RESISTOR, Fixed, same as R141	
R156	RESISTOR, Fixed, comp, 330 ohms ±5 per cent, 2w	HB3315
R157	RESISTOR, Fixed, comp, 100 ohms ±5 per cent, 1/2w	EB1015
R158	RESISTOR, Fixed, same as R104	
R159	RESISTOR, Variable, comp, two sections, 100,000 ohms ±10 per cent, and 10,000 ohms ±10 per cent, 1/4w with one spst switch	GC2-45
R160	RESISTOR, Fixed, comp, 220 ohms ±5 per cent, 1/2w	EB2215
S101	SWITCH, Rotary, ceramic	68972-JC
S102	SWITCH, Rotary, same as S101	
S103	SWITCH, Rotary, same as S101	
S104	SWITCH, Rotary, same as S101	
S105	SWITCH, Rotary, same as S101	
S106	SWITCH, Rotary, same as S101	
S107	SWITCH, Rotary, ceramic, 2 position, 1 section	100
S108	SWITCH, Rotary, spst, p/o R159	GC2-45
S109	SWITCH, Toggle, sp three position, momentary action	8866K2
T101	TRANSFORMER, RF	18592
T102	TRANSFORMER, RF	18601
T103	TRANSFORMER, RF	18605
T104	TRANSFORMER, Modulation	L1673

RECEIVER - Continued

Reference Designation	Description	Part No.
T105	TRANSFORMER, RF	18748
T106	TRANSFORMER, RF	18752
T107	TRANSFORMER, RF	18756
T108	TRANSFORMER, RF	18609
T109	TRANSFORMER, RF	18613
T110	TRANSFORMER, RF	18617
T111	TRANSFORMER, Same as T108	
T112	TRANSFORMER, Same as T109	
T113	TRANSFORMER, Same as T110	
T114	TRANSFORMER, RF	18621
T115	TRANSFORMER, RF	18625
T116	TRANSFORMER, RF	18629
T117	NOT USED	
T118	NOT USED	
T119	NOT USED	
T120	TRANSFORMER, Output	L1883
V101	ELECTRON TUBE, Type 5899	700-0132
V102	ELECTRON TUBE, Type 6112	700-0139
V103	ELECTRON TUBE, Same as V101	
V104	ELECTRON TUBE, Type 5718	700-0122
V105	ELECTRON TUBE, Same as V101	
V106	ELECTRON TUBE, Same as V101	
V107	ELECTRON TUBE, Same as V101	
V108	ELECTRON TUBE, Type 5896	700-0131
V109	ELECTRON TUBE, Type 6021	700-0136
V110	ELECTRON TUBE, Type 5902	700-0133
V111	ELECTRON TUBE, Same as V104	
V112	ELECTRON TUBE, Same as V109	
V113	ELECTRON TUBE, Same as V110	
V114	ELECTRON TUBE, Same as V110	
W101	CABLE, Coaxial	18327
W102	CABLE, Coaxial	18079
XDS101	LAMPHOLDER	Type 700
Z101	LOOP AMPLIFIER ASSEMBLY	17890
Z102	MODULATOR ASSEMBLY	17870
Z103	ANTENNA ASSEMBLY	18120
Z104	RF ASSEMBLY, First	17810
Z105	RF ASSEMBLY, Second	27070
Z106	OSCILLATOR ASSEMBLY	27010
Z107	TRANSFORMER, IF	18171
Z108	TRANSFORMER, Same as Z107	
Z109	TRANSFORMER, IF	18173

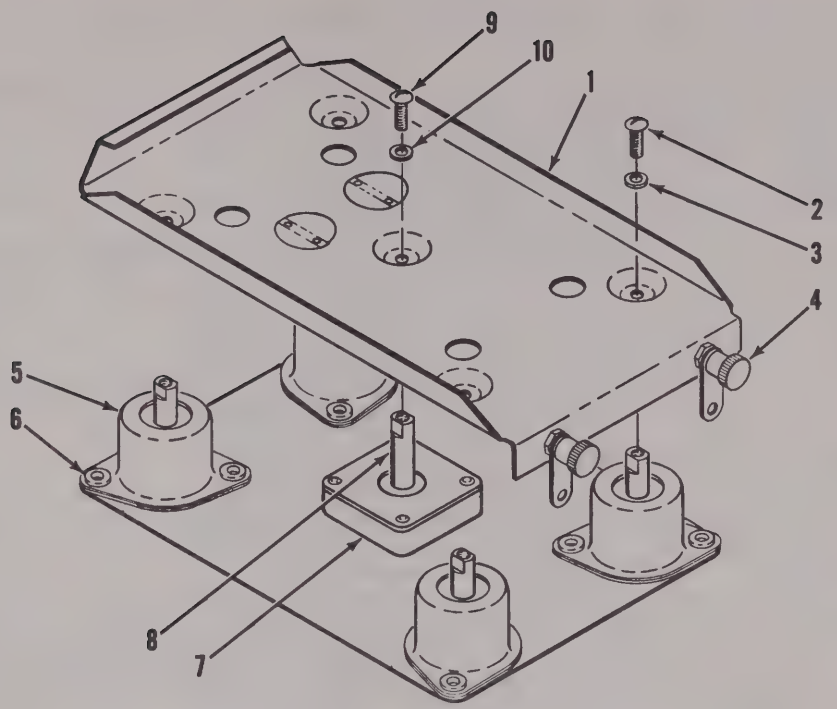


Figure 4-44. Mounting Assembly, Panel

Figure & Index No.	Part No.	Description 1 2 3 4 5 6	Units per Assy
		MOUNT	
4-44-	21650	MOUNTING ASSEMBLY	1
-1	21651	. MOUNTING	1
		(ATTACHING PARTS)	
-2	106	. SCREW	4
-3	4316	. LOCKWASHER	4
		- - - * - - -	
-4	11020	. SCREW ASSEMBLY, Locking	2
-5	8905	. ABSORBER ASSEMBLY, Shock	4
		(ATTACHING PARTS)	
-6	21655	. EYELET	2
		- - - * - - -	
-7	8906	. DAMPER	1
-8	21653	. POST	1
		(ATTACHING PARTS)	
-9	106	. SCREW	1
-10	4316	. LOCKWASHER	1
		- - - * - - -	

NOTE: Refer to Section I for Parts List of Mounting Assemblies, Panel Part Numbers 26780, 26790, 27591 and 27594.

PARTS LIST

Figure & Index No.	Part No.	1 2 3 4 5 6 Description	Units per Assy
4-45-	26960-0014	DYNAVERTER ASSEMBLY, (14 v)	1
4-45-	26960-0028	DYNAVERTER ASSEMBLY, (28 v)	1
-1	27810-1110	. PLATE, Identification, 14 v	1
-1	27810-0002	. PLATE, Identification, 28 v	1
		(ATTACHING PARTS)	
-2	type Z	. SCREW, Tapping, thread forming, rh, Phillips dr, stl, blk Parkerized, No. 2 by 5/32 in. lg	2
		- - - * - - -	
-3	27938	. COVER	1
		(ATTACHING PARTS)	
-4	Comm	. SCREW, Assembled washer, bind. h, brs screw, ni pl, sst lockwasher, No. 4-40 thd by 1/4 in. lg	4
		- - - * - - -	
-5	type 2N375	. TRANSISTOR	2
		(ATTACHING PARTS)	
-6	68NM-40	. NUT, Self locking, hexagon, No. 4-40 thd by 0.143 in. thk	4
		- - - * - - -	
-7	133-12-02-016	. SOCKET, Power transistor	2
		(ATTACHING PARTS)	
-8	142-0016	. SCREW, Machine, fh, brs, ni pl, No. 2-56 thd by 1/4 in. lg	2
-9	8275	. NUT, Hexagon, brs, ni pl, No. 2-56 thd by 0.050 in. thk	2
-10	1702	. WASHER, Lock, sst, 0.092 ID by 0.180 OD by 0.020 in. thk	2
		- - - * - - -	
-11	RS-2-2H	. RESISTOR, Fixed, ww, 2 ohms ±3 per cent 3 w (used in 28 volt model only)	1
-12	type 1N2070	. SEMICONDUCTOR DEVICE, Diode	1
-13	Z5U	. CAPACITOR, Fixed, ceramic, 0.022 µf +80 -20 per cent, 500 vdcw	1
-14	25994-0002	. BRACKET	1
		(ATTACHING PARTS)	
-15	103-0032	. SCREW, Machine, bind. h, brs, ni pl, No. 3-48 thd by 1/2 in. lg.	2
-16	4561	. NUT, Hexagon, brs, ni pl, No. 3-48 thd by 0.063 in. thk	2
-17	15155	. WASHER, Flat, aluminum, 0.120 ID by 0.234 OD by 0.032 in thk	2
		- - - * - - -	
-18	126-806	. CONNECTOR, Receptacle, electrical	1
-19	10284	. TERMINAL, Lug	1
		(ATTACHING PARTS)	
-20	Comm	. SCREW, Assembled washer, bind. h, brs screw, ni pl, sst lockwasher, No. 3-48 thd by 1/4 in. lg	1
-21	1703	. WASHER, Lock, sst, 0.105 ID by 0.220 OD by 0.025 in. thk	1
		- - - * - - -	
-22	L-1688	. REACTOR, 1.5 H	1
		(ATTACHING PARTS)	
-23	Comm	. SCREW, Assembled washer, bind. h, brs screw, ni pl, sst lockwasher, No. 2-56 thd by 1/4 in. lg	1
-24	102-0016	. SCREW, Machine, bind. h, brs, ni pl, No. 2-56 thd by 1/4 in. lg	1
-25	4012	. WASHER, Flat, brs, ni pl, 0.094 ID by 0.250 OD by 0.020 in. thk	1
		- - - * - - -	
-26	110D205X01 50GO	. CAPACITOR, Fixed electrolytic, 2 µf ±20 per cent, 150 vdcw	1
-27	18348	. CLAMP	1
-28	112D126C71 50 JO	. CAPACITOR, Fixed, electrolytic, 12 µf, +75 -15 per cent 150 vdcw	1
-29	18709	. CLIP, Spring Tension	1
		(ATTACHING PARTS)	
-30	Comm	. SCREW, Assembled washer, bind. h, brs screw, ni pl, sst lockwasher, No. 4-40 thd by 1/4 in. lg	1
		- - - * - - -	

PARTS LIST - Continued

Figure & Index No.	Part No.	1 2 3 4 5 6	Units per Assy
4-45-31	L-2254	REACTOR, 1.2 MH	1
		(ATTACHING PARTS)	
-32	503-0016	SCREW, Assembled washer, bind. h, brs screw, ni pl, sst lockwasher, No. 3-48 thd by 1/4 in. lg	2
		- - - * - - -	
-33	109D476X00 50F2	CAPACITOR, Fixed, electrolytic, 47 µf ±20 per cent, 50 vdcw	1
-34	601PE	CAPACITOR, Fixed, plastic. 0.22 µf ±20 per cent, 50 vdcw	1
-35	RS2-R75J	RESISTOR, Fixed, ww, 0.75 ohms ±5 per cent, 3 w (used in 14 volt model)	1
-35	RS2-2H	RESISTOR, Fixed, ww, 2 ohms ±3 per cent, 3 w (used in 28 volt model)	1
-36	Z5U	CAPACITOR, Fixed, ceramic, 0.022 µf +80 -20 per cent, 500 vdcw	1
-37	EB4705	RESISTOR, Fixed, comp, 47 ohms ±5 per cent, 1/2 w	1
-38	11-TE2	RESISTOR, Thermal, 10 ohms ±10 per cent at 25 deg C, 8 MW per deg C	1
-39	EB8215	RESISTOR, Fixed, comp, 820 ohms ±5 per cent, 1/2 w (used in 14 volt model)	1
-39	GB1625	RESISTOR, Fixed, comp, 1600 ohms ±5 per cent, 1 w (used in 28 volt model)	1
-40	BTC4411	TRANSFORMER, Oscillator (used in 14 volt model)	1
-40	BTC4412	TRANSFORMER, Oscillator (used in 28 volt model)	1
		(ATTACHING PARTS)	
-41	Comm	SCREW, Assembled washer, bind h, brs screw, ni pl, sst lockwasher, No. 6-32 thd by 5/16 in. lg	1
-42	106-0016	SCREW, Machine, bind. h, brs, ni pl, No. 6-32 thd by 1/4 in. lg	1
-43	7742	TERMINAL, Lug	1
		- - - * - - -	
-44	14699	TERMINAL ASSEMBLY	1
		(ATTACHING PARTS)	
-45	Comm	SCREW, Assembled washer, bind. h, brs screw, ni pl, sst lockwasher, No. 3-48 thd by 1/4 in. lg	1
-46	1703	WASHER, Lock, sst, 0.105 ID by 0.220 OD by 0.025 in. thk	1
		- - - * - - -	
-47	14484	RELAY, Armature (used in 14 volt model)	1
-47	14485	RELAY, Armature (used in 28 volt model)	1
		(ATTACHING PARTS)	
-48	Comm	SCREW, Assembled washer, bind. h, brs screw, ni pl, sst lockwasher, No. 3-48 thd by 5/32 in. lg	2
		- - - * - - -	
-49	22289	TRANSISTOR, Type 2N375	2
		(ATTACHING PARTS)	
-50	68NM-40	NUT, Self-locking, hexagon, No. 4-40 thd by 0.143 in. thk	4
		- - - * - - -	
-51	Z5U	CAPACITOR, Fixed, ceramic, 0.022 µf +80 -20 per cent, 500 vdcw	2
-52	133-12-02-016	SOCKET, Power transistor	2
		(ATTACHING PARTS)	
-53	142-0016	SCREW, Machine, fh, brs, ni pl, No. 2-56 thd by 1/4 in. lg	2
-54	8275	NUT, Hexagon, brs, ni pl, No. 2-56 by 0.050 in. thk	2
-55	1702	WASHER, Lock, sst, 0.092 ID by 0.180 OD by 0.020 in. thk	2
		- - - * - - -	
-56	27596	BRACKET ASSEMBLY	1
		(ATTACHING PARTS)	
-57	Comm	SCREW, Assembled washer, bind. h, brs screw, ni pl, sst lockwasher, No. 4-40 thd by 1/4 in. lg	2
		- - - * - - -	
-58	L-3143	TRANSFORMER, Output power (used in 14 volt model)	1
-58	L-3142	TRANSFORMER, Output power (used in 28 volt model)	1
		(ATTACHING PARTS)	

PARTS LIST - Continued

Figure & Index No.	Part No.	1 2 3 4 5 6 Description	Units per Assy
4-45-59	Comm	SCREW, Assembled washer, bind. h, brs screw, ni pl, sst lockwasher, No. 6-32 thd by 5/16 in. lg	1
-60	106-0016	SCREW, Machine, bind. h, brs, ni pl, No. 6-32 thd by 1/4 in. lg	1
-61	7742	TERMINAL, Lug	1
		- - - * - - -	
-62	112D126C71	CAPACITOR, Fixed, electrolytic, 12 µf +75 - 15 per cent, 150 vdcw	1
-63	18709	CLIP, Spring tension	1
		(ATTACHING PARTS)	
-64	Comm	SCREW, Assembled washer, bind. h, brs screw, ni pl, sst lockwasher, No. 4-40 thd by 1/4 in. lg	1
		- - - * - - -	
-65	J2M3684K	CAPACITOR, Fixed, plastic, 0.68 µf ±10 per cent, 200 vdcw	1
		(ATTACHING PARTS)	
-66	4041	NUT, Hexagon, brs, ni pl, No. 6-32 thd by 0.078 in. thk	1
-67	1706	WASHER, Lock, sst, 0.145 ID by 0.280 OD by 0.030 in. thk	1
		- - - * - - -	
-68	SBXM4P25	CAPACITOR, Fixed, paper, 0.25 µf ±5 per cent, 400 vdcw	1
		(ATTACHING PARTS)	
-69	8040	NUT, Hexagon, brs, ni pl, No. 4-40 thd by 0.062 in. thk	2
-70	1704	WASHER, Lock, sst, 0.119 ID by 0.260 OD by 0.029 in. thk	2
		- - - * - - -	
-71	J2M4334C	CAPACITOR, Fixed, plastic, 0.33 µf ±5 per cent, 400 vdcw	1
		(ATTACHING PARTS)	
-72	4041	NUT, Hexagon, brs, ni pl, No. 6-32 thd by 0.078 in. thk	1
-73	1706	WASHER, Lock sst, 0.145 ID by 0.280 OD by 0.030 in. thk	1
		- - - * - - -	
-74	27729-0014	TRANSFORMER, Toroidal (used in 14 volt model)	1
-74	27729-0028	TRANSFORMER, Toroidal (used in 28 volt models)	1
		(ATTACHING PARTS)	
-75	104-0016	SCREW, Machine, bind. h, brs, mi pl, No. 4-40 thd by 1/4 in. lg	1
-76	2104-04-00	TERMINAL, Lug	1
		- - - * - - -	
-77	18329	TRANSFORMER, Output	1
		(ATTACHING PARTS)	
-78	Comm	SCREW, Assembled washer, bind. h, brs screw, ni pl, sst lockwasher, No. 2-48 thd by 3/16 in. lg	2
-79	143-0012	SCREW, Machine, fh, brs, ni pl, No. 3-48 thd by 3/16 in. lg	2
		- - - * - - -	
-80	GLU1012SD3 028L	RESISTOR, Variable, Comp, 100 ohms ±20 per cent, 1/2 w	1
		(ATTACHING PARTS)	
-81	M4761	LOCKNUT, Hexagon, 1/4-32 thd	1
-82	M4721	NUT, Hexagon, 1/4-32 thd	1
-83	M4748	WASHER, Lock	1
		- - - * - - -	
-84	428	GROMMET, Rubber	1
-85	EB3925	RESISTOR, Fixed, comp, 3900 ohms ±5 per cent, 1/2 w (used in 14 volt model)	2
-85	EB1035	RESISTOR, Fixed, comp, 10,000 ohms ±5 per cent, 1/2 w (used in 28 volt model)	2
-86	150D105X00 35A2	CAPACITOR, Fixed, electrolytic, 1 µf ±20 per cent, 35 vdcw	1
-87	EB8205	RESISTOR, Fixed, comp, 82 ohms ±5 per cent, 1/2 w (used in 14 volt model)	1
-87	EB1815	RESISTOR, Fixed, comp, 180 ohms ±5 per cent 1/2 w (used in 28 volt model)	1
-88	27483-9221	COIL, RF, 2.2 MH ±10 per cent	1
-89	EB4735	RESISTOR, Fixed, comp, 47,000 ohms ±5 per cent, 1/2 w	1

PARTS LIST - Continued

Figure & Index No.	Part No.	1 2 3 4 5 6 Description	Units per Assy
4-45-90	EB8205	RESISTOR, Fixed, comp, 82 ohms ±5 per cent, 1/2 w (used in 14 volt model)	1
-90	EB1815	RESISTOR, Fixed, comp, 180 ohms ±5 per cent 1/2 w (used in 28 volt model)	1
-91	150D105X00 35A2	CAPACITOR, Fixed, electrolytic, 1μf ±20 per cent 35 vdcw	1
-92	type 1N2070	SEMICONDUCTOR DEVICE, Diode	2
-93	Z5U	CAPACITOR, Fixed, ceramic, 0.022 μf +80 -20 per cent, 500 vdcw	1
-94	12855	TERMINAL BOARD	2
		(ATTACHING PARTS)	
-95	Comm	SCREW, Assembled washer, bind. h, brs screw, ni pl, sst lockwasher, No. 3-48 thd by 3/16 in. lg	4
		- - - * - - -	
-96	428	GROMMET, Rubber	1
-97	27555	BRACKET ASSEMBLY	1
		(ATTACHING PARTS)	
-98	Comm	SCREW, Assembled washer, bind, h, brs screw, ni pl, sst lockwasher, No. 4-40 thd by 1/4 in. lg	1
-99	104-0016	SCREW, Machine, bind. h, brs, ni pl, No. 4-40 thd by 1/4 in. lg	1
-100	2104-04-00	TERMINAL, Lug	1
		- - - * - - -	
-101	4710	STUD, Threaded, No. 6-32 thd	2
		(ATTACHING PARTS)	
-102	4041	NUT, Hexagon, brs, ni pl, No. 6-32 thd by 0.078 in. thk	2
-103	1706	WASHER, Lock, sst, 0.145 ID by 0.280 OD by 0.030 in. thk	2
		- - - * - - -	
-104	11839	INSERT	2
		(ATTACHING PARTS)	
-105	Comm	SCREW, Assembled washer, bind. h, brs screw, ni pl, sst lockwasher, No. 4-40 thd by 7/32 in. lg	2
		- - - * - - -	
-106	27809	CHASSIS	1

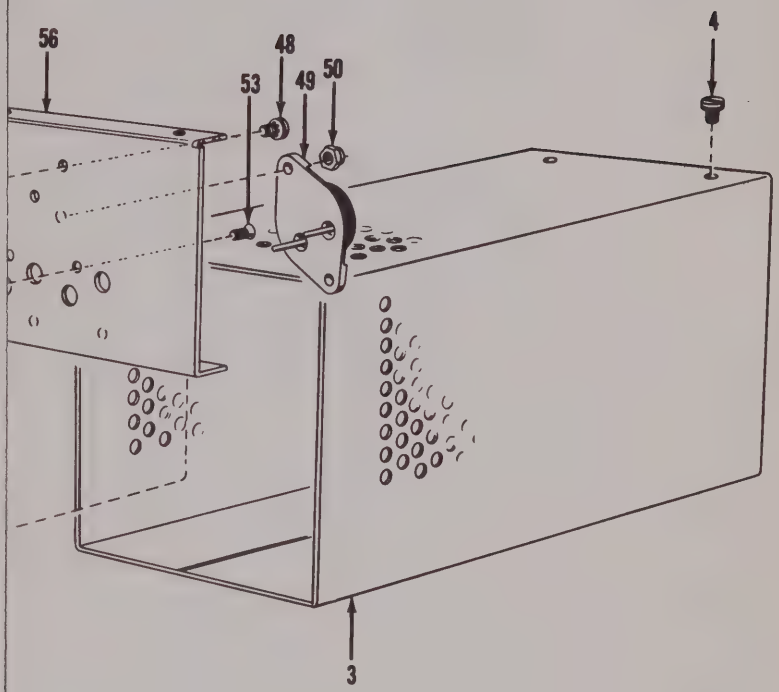


Figure 4-45. Dynaverter, Exploded View

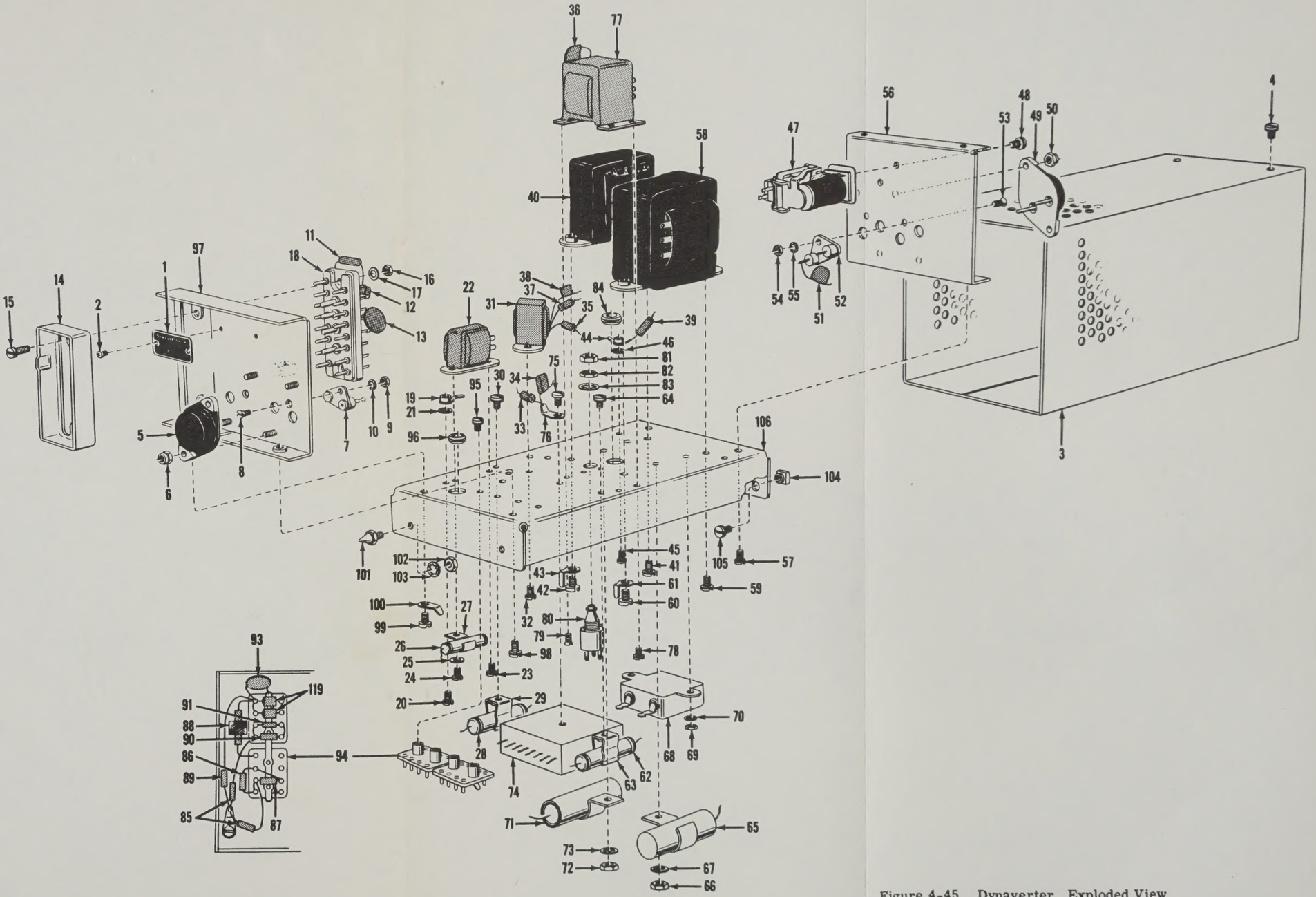


Figure 4-45. Dynaverter, Exploded View

CESSNA AIRCRAFT COMPANY

WICHITA, KANSAS